SCIENCE.

FRIDAY, DECEMBER 26, 1884.

A CHRISTMAS GREETING.

ALTHOUGH still an infant, having scarcely attained the age of two years, *Science* does not appear to-day in its usual leading-strings, but has been granted a certain license in accord with the season, of which it does not in the half know the meaning, and has been decked in a new dress to fit the day. That what the child says may be rambling, is to be expected: that what it may mean shall be clear, its lispings shall be translated. First look at its new dress, all salmon and brown. 'Arbor scientiae' does not mean that the plant is a scientific tree, nor yet a tree upon which science grows, but rather the tree is to symbolize the fact that science does grow. Inside the cover you will find a picture of the sun, taken at the Harvard college observatory, but of a composite nature, as all the prominences with which it is circled were actually observed, though not all at one time.

The sun has in all times been worshipped by some; but since it has been reduced to nothing more than a ball of fire rolling on through space, according to laws fixed by Sir Isaac Newton, his worshippers have many of them abandoned him. Still to a few faint souls it occurred that their old favorite could not fail them so utterly; and they have sought to show his influence on the growth of wheat, the price of stocks, and the pointing of the compass: of this there is more in the opening article. They would also call attention to the effect the sun has in bringing out the flowers, and the early birds, and the insects that the birds may have whereon to feed. We had not meant to give the sun-worshippers such vantage-ground; but, looking down the pages, we find something about tornadoes, about the variations of temperature at different points in the United States, and a map showing by lines the points at which the average mean temperature for the year is the same, — phenomena which depend on the sun, — and certain advice to farmers which would be of little avail if the sun should fail to perform its part. Whether earthquakes can be made to depend on the sun, we dare not say; but there are those who would not deny him even that power.

But at last we find some small evidence of a revolt against the tyranny of the sun. For years people would rise as the sun rose, they aimed to eat their dinners as the sun crossed the meridian, and they donned their nightcaps as the sun went down. A few wise men have long pointed out that the sun had by no means the regular habit he had the credit for; that often good people had eaten their pudding, and got well into their broth, before the sun had crossed the noon-mark. This is all changed. Man now gets up by a railway-whistle, eats his dinner by a railway-whistle, and counts his sleepless hours at night by railway-whistles. That it may be clear just how these whistles blow, we give a map showing the limits of railway-time. So the sun at last has lost a part of his former pre-eminence, and yielded it to the railway-king.

The natural instinct with each of us is to live within himself; he is quite startled when, at times, he notes that he is only one among a large community; and, as we view with indifference the toils of some distant Tasmanian, so does the Tasmanian live in utter ignorance of our toils. The maps of the stars we give are from some point in the solar system. We look at the stars as pretty, bright objects in a frosty sky. Suppose the maps made from the point of view of a dweller in the planetary system about σ Draconis: would our sun be given?

The innovations which science has brought to pass have startled a few; to allay which fear, *Science*, casting about in search of an anchor still left to which a well-regulated life may be moored, has hit upon the almanac, and therefore gives up the closing pages to such data of sun and moon risings and settings, of high tides and low tides, of planets good and planets bad, as may enable all its readers to know at least when it is day, and when night.

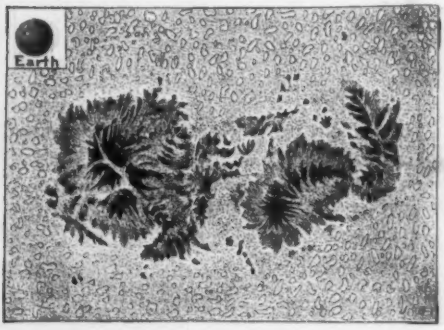
SUN-SPOTS AND THE EARTH.

"If dusky spots are varied on his brow,
And, streaked with red, a troubled color show;—
That sullen mixture shall at once declare
Winds, rain, and storms, and elemental war."
DRYDEN.

ONE of the most interesting questions of modern astronomy is whether sun-spots produce any effect upon terrestrial affairs, and, if so, of what nature is their influence, and how extensive?

It is an important question too; for, if they really do exert any thing like a commanding authority, then our knowledge of the laws that regulate their extent and frequency will give us a power of prediction, in respect to coming seasons, of the greatest value in all agricultural and commercial operations.

It was ascertained long ago (first by our own Henry), that as a sun-spot is darker, so also it is



SUN-SPOT AS SEEN JUNE 30, 1883

cooler, than the bright surface of the sun. According to the observations of Professor Langley, the black nucleus or *umbra* of a spot emits only about fifty-four per cent as much heat as an equal area of the normal surface; and the *penumbra*, the shaded fringe around the nucleus, about eighty per cent. If, then, any considerable portion of the solar surface were ever covered by the spots, we should reasonably expect a notable falling-off in the sun's light and heat, and an unmistakable effect upon climates and the weather.

It has been found, however, that, even in the most extreme cases yet observed, the portion of the sun's surface actually occupied by the spots is relatively very small, seldom amounting to a five-hundredth of the whole, and then only for a few days at a time. The direct temperature effect of sun-spots is therefore still more minute, never reaching a thousandth of the sun's whole heat.

But while their direct effect is thus insensible, it does not seem impossible, nor even improbable, that the spots might be indicative of an abnormal condition of things upon the sun's surface, such as would seriously affect the earth's revenue of heat. We might suppose, for instance, that they are symptoms of a general chilling of the solar surface, or, on the other hand, that they are caused by some ebullition from beneath the surface, which would, on the whole, raise the temperature instead of lowering it, and so compensate, or even overbalance, the effect of their darkness.

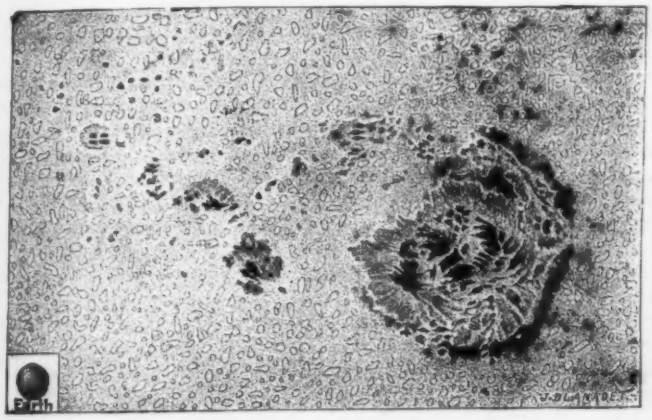
In regard to this, it is now only possible to say that the change, if any, is too slight to be detected by our present means of observation. It is earnestly to be hoped, that before long some apparatus and method of observation may be devised delicate enough to deal with the problem; but at present they do not exist, and no one knows with certainty whether the sun's radiation is increased or diminished when sun-spots are most prevalent.

A priori, then, we have no reason for expecting any perceptible effect of sun-spots upon the earth's conditions. But, on the other hand, it would not do to assume that they have none; that a variation in the sun's heat, even too small to be directly measurable, may not *indirectly* produce very important consequences by disturbing some nicely adjusted equilibrium. The gentlest touch of a child's finger may depress a key, and fire a mine. It is easy to imagine many ways in which an extremely slight change in the temperature might occasion, if it did not strictly cause, such alterations in the cloudiness, or in the direction and velocity of winds, as would seriously modify the climates and the fertility of large regions of the earth. The question is simply one of fact.

Since, however, it has been discovered that there is a somewhat regular, though unexplained, increase and decrease in the number and extent of the sun-spots (with a period of about eleven years), we are in a position to investigate the subject statistically. It is only necessary to compare the tabulated data relating to the spots with those relating to temperature, barometric pressure, magnetic disturbance, rainfall, height of water in rivers, — every thing, in fact, that fluctuates in our terrestrial affairs: we may even justifiably and properly include in our inquiries such matters as the price of grain and stocks, financial crises, and epidemic diseases. If in any case we find that in a sufficiently long run

the variations in the sun-spot data correspond exactly to those relating to the element under examination, we shall be compelled to admit some sort of a causal connection; and that, even if the nature of the connection is inscrutable.

Numerous such comparisons have been made during the past twenty-five years. So far the results must be pronounced indecisive, except as regards the effects of solar disturbances upon terrestrial magnetism. Here all the investigations agree in showing an intimate connection, the mechanism of which is, however, still unknown. When sun-spots are numerous and active, we always have magnetic storms upon the earth, manifested by the aurora-borealis and by strong disturbance of our compass-needles.



SUN-SPOT AS SEEN JULY 25, 1883.

The investigations in regard to other elements have, as Professor Langley says, "nearly every one brought out some result which might be plausible if it stood alone, but which is apt to be contradicted by the others." For instance: Dr. Gould in South America, and Mr. Stone at the Cape of Good Hope, think they have detected a slight lowering of temperature, amounting to one or two degrees, at the time of sun-spot maximum; while at Edinburgh, Smyth reaches a similar conclusion, except that the minimum temperature follows the sun-spot maximum at an interval of about two years. On the other hand, Chambers, from twenty-eight years' observations in India, finds a *rise of temperature* coinciding with the sun-spot maximum; and, in opposition to all the others, Jelinek of Prague, from all the observations he could collect in Germany up to 1870, obtained a purely negative result. Discrepancies of the same sort appear in the results of other investigators, with reference to the rainfall and the height of rivers in different parts of the earth; though, on the whole, they seem to show a slight increase in the rainfall (one or two per cent) at or near the time of spot-maximum.

It is to be remarked, however, that these discrepancies and contradictions by no means disprove the reality of sun-spot influence. It is quite possible, and even likely, as Dr. Gould and others have pointed out, that slight changes in the sun's radiation might be felt mainly by their effect in disturbing atmospheric currents, and so altering the distribution of heat and moisture, rather than by any general effect. In this case, the effects in neighboring regions would evidently be exactly opposite in character.

As matters stand, it is clear, in the first place, that a much longer period of observations will be needed to settle the question decisively as to the reality of sun-spot influence; and, in the next place, that, if the influence is real, it is only slight, and so masked by other effects as to be difficult of detection. There can be no reasonable expectation that the ordinary variations in the state of the solar surface will prove to be dominant, or even very important, in terrestrial meteorology, or in human conditions that depend upon climate and the weather.

THE INSECTS OF THE YEAR.

"Fairy bands
Sailing, 'mid the golden air,
In skiffs of yielding gossamer."
HOGG.

THE seasonal appearance of insects varies. Some species are found during several months, others at all times of the year; some vary in date of appearance with the earliness or lateness of the

season, while others appear quite punctually, regardless of the season. In the same locality the peach will blossom one year in February, another not till May; and there is similar variation in the first appearance of spring insects. The irregularity lessens, however, as the growing season advances. July is more uniform than April. From Boston to Enterprise, Fla., one may travel in a couple of days in January from ice-bound midwinter to summer temperature, and, with the progress southward, activity in both plant and insect life increases. In a country so vast that it represents sub-boreal and sub-tropical temperatures at one and the same time, it were eminently improper to speak of the appearance of an insect without specifying the latitude. The midwinter difference between Maine and Florida, however, is not the difference between dead of winter, and height of summer; because there is, even in the subtropical sections, a winter or hibernating period when insect-life is comparatively at a stand-still, or dormant.

For calendar purposes the country may be divided into northern, middle, and southern; and, where not otherwise stated, the following index to the first appearance of some of our more conspicuous insects will have reference to some middle latitude. St. Louis is a very good point, being central between the Atlantic and the Rocky Mountains, our northern boundary and the Gulf; while Washington is another, lying well between our northernmost and southernmost borders. Between the Gulf and Lake Superior there is a difference in earliness of spring forms of nearly two months, or of four to five days with each degree of latitude, as the history of the Rocky-Mountain locust (Caloptenus spretus) and of the army-worm (Leucania unipuncta) shows. This difference, as already indicated, diminishes for summer forms. Development quickens in adaptation to the shorter northern season; and a widely distributed species, that does not mature till August in Missouri, or even Texas, may appear but a few days later in Minnesota.

January. — Hushed in a frosty cradle, as most lower life is at this season, the snow-fleas (genus Podura) — little, black, springing creatures not more than one-twentieth of an inch in length — may nevertheless be seen during a mild spell, abounding on the snow, even in the more northern states. To the southward, whenever the temperature is above freezing-point, the farmer will start from his corn-shocks various hibernating bugs, as the chinch-bug (Blissus leucopterus) and the tarnished plant-bug (Lygus lineolaris); while the housekeeper may be alarmed by the buzzing of the paper-wasps (genus Polistes), and particularly Polistes metricus and P. annularis. Still farther south many butterflies, especially the yellows (genus Colias) and the whites (genus Pieris), so common everywhere later in the season, may be observed.

February. — In average or normal years the insect-life of this month resembles that of the preceding. On mild days swarms of small gnats (Chironomidae) dance in the air near still waters, while near larger streams small sombre-colored Neuroptera (Perlidae) will often fly. The wingless female of the spring canker-worm moth (Paleacrita vernata) ascends the trunks of apple and elm trees, while the male, with ample wings, flits about her. In the extreme north the remarkable wingless and spider-like dipteron (Chionea valga) and the equally remarkable neuropteron (Boreus nivoriundus), also wingless in the female sex, may be seen upon the snow; while in the south our heaviest-bodied butterfly (Megathymus yuccae) and our most graceful species (Heliconia charitonia) are conspicuous, — the one darting swiftly among the yuccas, the other slowly sailing through the dense underbrush of the shady hammocks.

March. — Insect activity now rapidly increases. With the thawing of the ice in ponds and ditches, the water-beetles (Dytiscidae) appear, while in the woods many species of ants (Formica) make their way from their subterranean abodes. Many pine-boring beetles (Buprestidae and Scolytidae) are seen, and a small dung-beetle (Aphodius inquinatus) flies in countless numbers. The velvety brown larva of Telephorus will follow the melting snow, the brown and black hedge-hog caterpillar (Arctia isabella) will scamper across a sun-warmed path, and the dipterous Bibio larvae will be found in masses under decaying leaves in the garden. Of butterflies, the mourning-cloak (Vanessa antiopa), with its beautiful purple-brown and cream-margined wings, somewhat the worse for wear, is conspicuous; and, of moths, the cotton-worm moth (Aletia xylina), the army-worm moth (Leucania unipuncta), and Platyhypena scabra, are noteworthy in the south.

April. — The first flowers of spring, and especially the catkins of willows and poplars, teem with insects of many orders, but especially the Hymenoptera of the genera Andrena, Halictus, Melissodes, and Nomada, which have issued from their underground nests. The honey-bee (Apis mellifica), the carpenter-bee (Xylocopa virginica), and the bumble-

bee (Bombus) are conspicuous. Among Coleoptera, the blister-beetles (Meloidae) and the tiger-beetles (Cicindelidae) are noticeable; and the painted clytus (Cyllene pictus), with its black-and-yellow banded coat, will be common in houses where hickory-wood is used in the fires. Among Lepidoptera, the blues (Lycaenidae), the monarch or milk-weed butterfly (Danais archippus), the Graptas, and Eudamus bathyllus will be seen. Among Orthoptera, the Acridium americanum and Oedipoda phoenicoptera will be noticeable among wintering forms on account of their large size.

May. — In this month the hibernated legion is warmed to new life, and the number of species occurring is too great to warrant special indication. The large tiger swallow-tail (Papilio turnus) darts swiftly about, while a lot of humbler butterflies are seen. Those gigantic beauties of the night, the Cecropia moth (Platysamia cecropia) and the Polyphemus moth (Telea polyphemus), are seen hanging listless as they just issue from their cocoons, or pass bat-like at dusk overhead. Some of the hawk-moths (Sphingidae) already begin to hover at twilight, humming-bird fashion, over honeysuckle and other honey-yielding flowers. The carpenter moth (Xyleutes robiniae) will be found early in the morning, resting on the trunk of the black locust, from which the empty pupal exuvium sticks out as an index. A host of Hymenoptera make their advent; and noticeably the gigantic saw-fly (Cimbex americana) will be found ovipositing in willow leaves, and the pigeon Tremex (Tremex columba) in old maple trunks. The buffalo-gnat (Simulium) swarms in the lower Mississippi country to the injury of all kinds of stock. The fruit-grower finds the plum curculio (Conotrachelus nenuphar) making its dreaded crescent-mark on his fruit, and the canker-worms blighting his apple-trees. The housekeeper observes with dread the various clothes-moths (Tinea) and the carpet-beetle (Anthrenus scrophulariae). But the latter part of the month is chiefly characterized, first, by the hosts of delicate May-flies (Ephemeridae) which issue from our rivers in the sub-imago state, and, attracted to the light, crowd on windows and around lamps; second, by the swarms of more robust May-beetles (Lachnosterna fusca), which begin to defoliate oak-groves and poplar-trees.

June. — During this leafy month, when nature's pulses beat most strongly, insect-life is at its acme. The army-worm marches through meadow and grain-field, and a host of destructive species gather force and spread dismay. The woods and meadows abound in gaudy butterflies, and multiform caterpillars feed voraciously. The commoner firefly (Photinus pyralis) rises slowly from the moist ground at eve, and intermits its soft, glowing light. But the month is chiefly characterized by the appearance of that singular periodical, or seventeen-year Cicada (Cicada septendecim), with its *tredecim*, or thirteen-year race. The woods rattle with its hoarse beat about the first of the month, and broods appear in some locality or other nearly every year. The present year (1885) is a memorable one; for a very extensive seventeen-year brood, which appeared last in 1868, and has been fully recorded every seventeen years since 1715, may be looked for on Long Island and in Monroe county, N.Y., in south-eastern Massachusetts, in parts of Vermont, Pennsylvania, Delaware, Maryland, Virginia, District of Columbia, in north-western Ohio, in south-eastern Michigan, in Indiana, and in Kentucky.

July. — With the great heat of July there is less variety of insect-life than in June, and the month is chiefly notable for the tormentors. Horse-flies (Tabanidae) interfere with the ploughman's work, mosquitoes swarm to such an extent in the north-west as to render travel for both man and beast positively dangerous, while the bot-flies (Oestridae) attack horses, cattle, and sheep. The nests of the tent-caterpillar (Clisiocampa americana) and of the fall web-worm (Hyphantria textor) disfigure orchard and forest, and the tumble-dungs (Canthon) assiduously roll their balls of dung. The harsh rattle of the dog-day harvest-fly (Cicada canicularis) is also first heard.

August. — In this month the fossorial Hymenoptera most abound, and the numerous locusts (Acridiidae) begin to get their wings, and reach their greatest destructiveness. The katydids and the tree-crickets also become full-fledged, and join the other insect stridulators which fill the late summer and autumn nights with sound. The cotton-worm does its greatest mischief in the south, and the chinch-bug leaves the wheat-fields for the maize. Many true bugs (Hemiptera) get their wings, among which the wheel-bug (Reduvius novenarius) is conspicuous. The dragon-flies (Libellulidae) are more numerous, and the mantis (Mantis carolina) and the walking-stick (Diapheromera femorata) acquire full growth, and are more noticeable than formerly.

September. — Many of the insects of the preceding month are still more noticeable in this, while few new ones appear. The blister-beetles and a vast number of smaller Hymenoptera abound on the flowers of the golden-rod; and most species are

busy providing for their issue, or preparing for winter quarters.

October. — This is the month when spiders of all kinds are most noticeable, their gossamer threads glistening high up in the air, or their webs disfiguring shrubs and buildings. Immigrant plant-lice come on the wing to store away the winter egg on congenial trees; and the other insects most noticeable are those which hibernate, and are getting ready to do so. The buck moth (Hemileuca maia) flies quietly, with its delicate crape-like wings, among the dropping leaves of the forest, and is the species most peculiar to the month.

November. — In this month most insects are hushed in death or torpor; but the fall canker-worm moths will rise from the ground after a severe frost, and many hibernating Hymenoptera and Coleoptera will take an airing when the weather is mild. The cluster-fly (Pollenia rudis) holds out against the cold much longer than the house-fly, which it so much resembles.

December. — Nothing peculiar marks this month; but most of the species mentioned for both November and January may be seen in December, when the temperature and circumstances favor.

WEATHER FORECASTS.

"Another storm brewing; I hear it
Sing i' the wind."

SHAKSPEARE.

THE methods by which weather forecasts are made are based almost wholly upon facts of observation rather than upon established deductions of science. This is unavoidable, because atmospheric movements are very complicated, and because the science of meteorology is not yet sufficiently advanced to satisfactorily explain them in the detail necessary for successful forecasting.

The leading fact upon which predictions depend is that atmospheric conditions advance in a direction generally easterly. The motion may vary in velocity, but in direction is usually between north-east and south-east, rarely towards any other point of the compass. During this advance, changes in condition may occur; and it is necessary to foresee the character of these changes, as well as the direction, and rate of motion. The indications of the barometer are the chief aid in understanding the weather conditions themselves, and the changes which may be expected. At any given moment there exist, in the territory occupied by the United States, differences in the atmospheric pressure which may amount to two inches in the height of the barometer. Usually there are one or more areas of pressure above the average, and one or more below the average, the pressures at intermediate points lying between the highest and lowest values. Each of these areas of high and of low pressure is accompanied by its peculiar conditions, and is moving towards the Atlantic coast with varying velocity. Thus the low area, if its centre is more than two or three tenths of an inch below the average pressure, is accompanied by clouds, and rain or snow, and forms a storm. The area of high pressure is usually attended by clear skies; and the radiation of solar heat to the earth during the day, or from the earth at night, is unchecked by clouds: consequently in summer, when the days are long, the temperatures which accompany an area of high pressure are above the average; while in winter, when the nights are long, low temperatures are found with high pressures. Many similar facts have been learned from the study of meteorological observations, upon which dependence is placed in weather-predicting.

Under the auspices of the U.S. signal-service, observations are made three times each day at a hundred and twenty-nine stations suitably located. Each of these observations is made at the same moment (seven A.M., three P.M., and eleven P.M., Washington time), and includes determinations of the atmospheric pressure, the temperature and humidity of the air, the direction and velocity of the wind, the kinds and motion of clouds, and other meteorological data. The results are at once telegraphed to the central office, and maps formed which show graphically the conditions at the moment of observation, and the changes which have occurred in the past few hours. From these maps a detailed prediction is made for the twenty-four hours following, based upon the conditions which exist at the time, the changes which have occurred, and the changes which, former experience shows, usually follow similar conditions.

The weather prediction thus assumes that coming changes will agree with the changes noted in former times under like circumstances. This is true on the average; but, whenever exceptions occur, the prediction fails. Increased skill in predicting depends upon increased skill in anticipating these exceptional cases. At the present time the government predictions are verified in eight cases out of ten. Reliable forecasts cannot be made for a period longer than twenty-four hours,

though it is hoped that an increase in the time may be successfully made at some future day. There is needed a better understanding of the laws which underlie atmospheric changes, so that empirical generalizations may give way to scientific deductions.

EARTHQUAKES IN THE UNITED STATES AND CANADA.

"Some say, the earth
Was feverous, and did shake."
SHAKSPEARE.

THE part of the earth's surface occupied by the United States is not generally regarded as much affected by earthquakes. As compared with some other localities, this is true; yet records show that moderate earthquakes are not so infrequent here as is usually supposed.

In the twelve years from 1872 to 1883 inclusive, three hundred and sixty-four earthquakes have been recorded as occurring in Canada and the United States, not including Alaska. Their geographical distribution may be expressed in this way. Suppose the country divided into three districts,—one extending from the Pacific Ocean eastward, to include Idaho, Utah, and Arizona, which may be called the Pacific slope; the second extending from Montana, Wyoming, Colorado, and New Mexico eastward, to include Ohio, Kentucky, Tennessee, and Alabama, which may be called the Mississippi valley; and the third, or Atlantic slope, extending eastward again to the Atlantic Ocean, and including the Appalachian region from the St. Lawrence to Florida and Georgia. Then the distribution of these three hundred and sixty-four earthquakes has been

Pacific slope	151
Mississippi valley	66
Atlantic slope	147
	364

These numbers indicate that about once in twelve days an earthquake occurs *somewhere* in the United States or Canada, and about once a month one occurs somewhere on the Atlantic slope.

It is quite likely, also, that for every earthquake which is of sufficient intensity to get itself noted in the midst of our busy American life, several lighter tremors may have occurred, which, although not violent enough to attract the attention of any one, would yet have left their record on a properly constructed seismoscope.

So, if any of our readers feel disposed to set up a seismoscope, they need not be deterred by the paucity of shocks in our country. A seismoscope anywhere along our eastern seaboard, or, still better, on the western coast, might fairly be expected to record ten or a dozen shocks in the course of the year, and might detect a much larger number. Such observations would be of high scientific value.

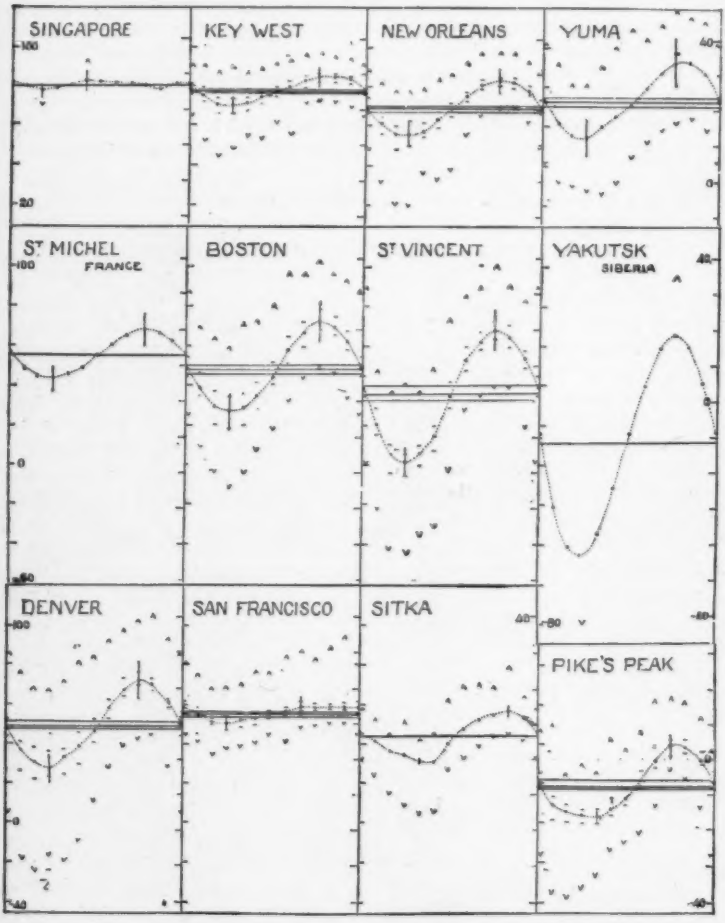
TEMPERATURE AND ITS CHANGES IN THE UNITED STATES.

"For hot, cold, moist, and dry, four champions fierce
Strive here for mastery."
MILTON.

IN the United States the changes of temperature with the seasons are of several types. These are illustrated in the accompanying diagrams, constructed chiefly from our signal-service reports; the thermometric scale being indicated by marks for every twenty degrees Fahrenheit on the left, and for every ten degrees Centigrade on the right, of each local division. The middle horizontal line shows the measure of that arithmetical abstraction commonly known as the mean annual temperature; and the adjoining lines above and below indicate how much variation there may be in the means of different years. In this respect, St. Vincent, Minn., has a much more irregular climate than Key West. The dots connected by a fine, dotted, curved line, represent the mean monthly temperature, beginning with October on the left side, descending to the January minimum, crossing the mean annual line about April, on the way to the July maximum, and descending again to October on the right margin. In illustration of the least annual variation, a curve is introduced for the equatorial station of Singapore, at the extremity of the Malay Peninsula, where the mean annual change is only seven degrees (F.); and, in contrast with this torrid uniformity, we find Yakutsk, Siberia, in the so-called temperate zone, giving the greatest known annual variation, on account of being far north, and far within a great continental region. St. Vincent, the coldest of the signal-service stations, is probably our nearest approach to this extreme variability.

The irregularity of the monthly means in different years is shown by short transverse lines above and below the dots: these are farther apart in winter than in summer, on account of the frequency of winter storms which produce great and sudden

changes of temperature.[1] A rough measure of the average daily range for summer and winter is seen in the vertical lines drawn through the July and January dots: these are commonly longer in summer than in winter. The hottest and coldest records for every month are marked by A and V.



Denver is thus seen to be warmer but more variable than Pike's Peak. In San Francisco the summer heat extremes rise higher above the mean curve than the winter colds fall below it, while the reverse is the case with New Orleans. The extreme variation between winter minimum and summer maximum, even of different years, is only 23° F. at Singapore: our least variable station is Key West, with a maximum change of 53° F. Yuma, Arizona, although well known as often excessively hot, confines its variations within 93°; Denver has a recorded change of 134° from 105° to −29°; while Fort Benton, Montana, leads the list with a change of 167°, between 108° and − 59°, but even this is exceeded at Yakutsk. The contrast between eastern and western coasts is seen in the variability of Boston as compared with St. Michel, on the coast of France in about the same latitude, the latter being warmer and less variable because it lies to the leeward of a temperate ocean, while Boston is to leeward of an untempered land; and again in comparing Boston (in latitude 42° 21′) with Sitka (in latitude 57° 3′), and recognizing the small difference in their mean temperatures, and the decided decrease in variability, annual and diurnal, in going from the east coast to the west. The effect of going inland is to increase changes of temperature; for, while the sea is conservative of its warmth or cold, the land allows great and rapid variations. If the climatic zones had been first named in this country, ours would never have been called the 'temperate.'

[1] The variation of monthly means for Boston is large, in comparison with that of the other diagrams, partly because it is taken from a thirty-five year record instead of from the eleven or fewer years of the signal-service reports.

THE COMING OF THE ROBIN AND OTHER EARLY BIRDS.

"Hast thou named all the birds without a gun?
Loved the wild-rose, and left it on its stalk?"
EMERSON.

THE migration of birds is a subject which is attracting much attention in many parts of the world. From earliest historic times, naturalists and philosophers have written, speculated, and theorized upon the periodic appearance and disappearance of the species with which they were familiar; and the coming and going of many were considered of ominous portent.

In more recent times, ornithologists have watched the movements of birds with increasing interest, and have accurately recorded the facts observed. But it is only within the last few years that any thing like a systematic co-operative attempt to study bird-migration has been made. The work was begun in Germany, and was soon afterwards undertaken in Great Britain. In the United States, co-operative work was commenced in the Mississippi valley in the spring of 1882, under the superintendence of Prof. W. W. Cooke. The investigation of this subject was deemed of such importance that the American ornithologists' union, at its first congress, determined to extend it over the whole of North America, and for this purpose appointed a special committee. This committee prepared a circular (of which six thousand copies were distributed), setting forth the objects in view, and the methods by which they were to be attained. Through the co-operation of the department of marine of Canada, and of the lighthouse boards of the United States and Newfoundland, blank schedules were also supplied to the keepers of lighthouses, lightships, and beacons, throughout the whole of North America. The committee has already received returns from nearly a thousand stations, which are scattered over the whole country, extending, in the east, from Sombrero Key, Fla., to Newfoundland, and, in the west, from Arizona and southern California to British Columbia.

Most birds migrate chiefly by night. In clear weather they fly high, often from one to two miles above the country over which they are passing; while during dark nights, particularly in foggy weather, they often lose the way, become confused, and fly directly toward any light that may chance to lie within the field of vision. Thus, every year many thousands dash themselves to death against lighthouses and lightships. Birds whose summer and winter homes are widely separated often shorten their long journeys by crossing great lakes, broad bays, extensive seas, and sometimes even considerable stretches of open ocean; and observations in various parts of the world, carried on over many years, have demonstrated that the places of crossing are not accidental, but that certain definite courses are followed season after season with surprising regularity and precision. These 'avenues' or 'lines' of migration, though most strongly marked in aquatic, marsh, and river-dwelling species, are not limited to the neighborhood of large bodies of water, but may be traced throughout the entire range of migration. It is also well known that in nearly all birds the same individuals return to identical localities year after year.

The following statement of the times of arrival of the robin (Merula migratoria) at various places will serve to show in a general way the progress of its advance over the greater part of North America during the spring of 1884.[1]

Our common robin winters in vast numbers as far north as North Carolina, and more sparingly in southern New England, New York, and even in southern Ontario north of Lake Erie. On its northward journey, Dr. Wheaton's observers in the middle-eastern district found it at Columbus, O., Feb. 13; Cleveland, O., Feb. 24; Petersburg, Mich., Feb. 19; Battle Creek and Locke, Mich., March 10; Sault St. Marie, April 1. In the Atlantic district, Dr. Fisher's returns show it at Long-Island City, N.Y., Feb. 10; Sing Sing, N.Y., Feb. 14; Lockport, N.Y., Feb. 16; Watertown, N.Y., March 13; Lake George, N.Y., March 20; Hammondville (near Lake Champlain), N.Y., March 24; Boonville, N.Y., March 21; Locust Grove, N.Y., March 25. In Ontario, Mr. McIlwraith reports it at Hamilton, March 17; and at Ottawa, March 14. In New England a few wintered in the southern portions, and their march northward was irregular and often interrupted. Mr. Sage's observers recorded them from East Hartford, Conn., Feb. 2; Greenfield, Mass., Feb. 3; Thetford, Vt., Feb. 22; Hanover, N.H., March 21; Waterborough, Me., March 23; Calais, Me., March 30: Moosehead Lake, Me., April 9. In Quebec and the maritime provinces, Mr. Chamberlain's report shows them at Montreal, March 30; Quebec, April 14; Grand Menan Island, March 10; Halifax, March 18;

[1] These data, by permission of the council of the American ornithologists' union, have been selected from a part of the returns on the species named.

St. John, N.B., March 20; Prince Edward Island, April 15; Godbout, on the north shore of the mouth of the St. Lawrence, May 21; Point Rich, Newfoundland, May 1; and Greenly Island, off Labrador, May 20. In the Mississippi valley, Prof. W. W. Cooke has ascertained that robins usually winter north to about latitude 39°, but that the unusual cold of January, 1884, drove the bulk of them south of the parallel of 37°. Returning, the regular advance began March 9, and in a single week they spread over Illinois and eastern Nebraska to latitude 41° 51′; March 16 there was a slight advance in Iowa; on the 19th and 20th they pushed forward in Iowa, Illinois, and Wisconsin (but not in Nebraska), to latitude 43°; March 21 there was a sudden spreading over Wisconsin to latitude 45°. In the Red-river country, latitude 47° was attained April 3; and one week later the first robin of the season sang at Oak Point, Manitoba, latitude 50° 30′. From Mr. Belding's notes, it appears that the western race of the robin (Merula migratoria propinqua) winters more or less abundantly throughout the greater part of California, moving northward in February, March, and April. Its nest and eggs were found at Seattle, Washington Territory, May 1. In Alaska our robin has been seen in the Chilkat region as early as the end of April, and at Nulato about the middle of May.

The following statement shows approximately the average dates of arrival, in the latitude of New-York City and southern Connecticut, of a number of common and well-known birds. The yearly variation is considerable, and is greatest in the early-comers, amounting in some cases to upwards of two weeks. The robin (Merula migratoria) may be expected about the middle of February; wood-thrush (Turdus mustelinus), first week in May; brown thrasher (Harporhynchus rufus), May 1; catbird (Mimus Carolinensis), May 1; bluebird (Sialia sialis), early in February; house-wren (Troglody tesaedon), May 1; yellow-rumped warbler (Dendroeca coronata), middle of April; barn-swallow (Hirundo erythrogastra horreorum), April 25; scarlet tanager (Pyranga rubra), May 10; red-eyed vireo (Vireo olivaceus), May 6; rose-breasted grosbeak (Zamelodia ludoviciana), May 12; indigo-bird (Passerina cyanea), May 12; chewink (Pipilo erythrophthalmus), May 1; bobolink (Dolichonyx oryzivorus), May 10; red-winged blackbird (Agelaeus phoeniceus), March 1; Baltimore oriole (Icterus galbula), May 8; king-bird (Tyrannus Carolinensis), May 8; pewee (Sayornis fuscus), early March; whippoorwill (Caprimulgus vociferus), May 1; night-hawk (Chordeiles pepetue), May 10; chimney-swift (Chaetura pelasgica), latter part of April; humming-bird (Trochilus colubris), May 5; kingfisher (Ceryle alcyon), flicker (Colaptes auratus), and fish-hawk (Pandion haliaetus Carolinensis), late in March.

TORNADOES, AND HOW TO ESCAPE THEM.

"Blow, winds, and crack your cheeks! Rage! blow!
You cataracts and hurricanoes, spout
Till you have drench'd our steeples, drown'd the cocks!
. . . . . .
Nay, get thee in. I'll pray, and then I'll sleep."

SHAKSPEARE.

TORNADOES are among the most characteristic features of the central states of the Union. Their opportunity comes when a broad cyclonic disturbance of our regular westerly winds brings cold air of the north-western plains down to meet warm southerly winds from the Gulf of Mexico. A moderate number of miles east of the average contact-lines of these two currents, the tornadoes are formed, when they appear at all. A number of them frequently occur at about the same time, for the contrasts of temperature and moisture that permit the development of one are generally widespread enough to produce several more. Fig. 1 illustrates the tracks of the tornadoes of Feb. 19, 1883, when the southern states were swept over by

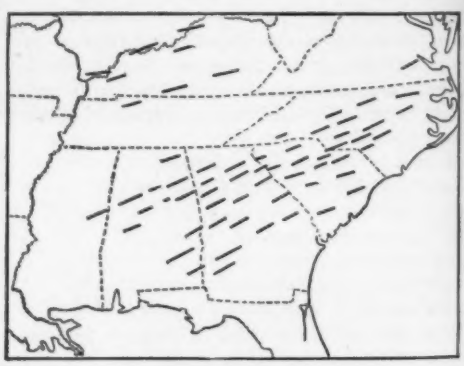


FIG. 1.

a large number of these storms, — in Kentucky and Alabama about noon, in eastern Alabama and Georgia during the afternoon, and in the Carolinas

after sunset, — the progress of their region of occurrence across the country corresponding to the passage of the broad cyclonic storm that gave them birth. The signal-service report states that about a thousand persons were killed, more than twice as many wounded, and three or four million dollars' worth of property destroyed, by these storms on this single day. This was the first and severest visitation of the year.

The distinguishing mark of the tornado is its dark, pendent funnel-cloud at the centre of the most violent winds. The rules published by the signal-service for escaping from such a storm, when it is seen approaching, are based on the regularity with which tornadoes move to the north-east, or at least to some point between east and north, along a tolerably straight course, at a rate of about thirty

FIG. 2.

miles an hour. If seen to the north-west or south-east, the tornado will, in all probability, pass to one side of the observer. If seen in the south-west, a few moments' watching will serve to discover whether the funnel-cloud is advancing so as to pass north-west or south-east of the observer; then, without waiting too long, let him run to the open side. If the funnel-cloud seems to come directly toward the observer, he should run to the north-west, because the winds on that side are a little less violent than on the other, and the chance of escape there is correspondingly better. In regions where tornadoes occur frequently, every house should be provided with an underground chamber or dug-out, easily reached, and guarded by a strong grated door. This is the only retreat on the storm-path in which safety can be found. The effect of a tornado on the buildings of a western town is seen in fig. 2, copied from a photograph taken by D. H. Cross at Grinnell, Io., shortly after its destruction on June 17, 1882.

BLOOMING-TIMES FOR FLOWERS.

"And 'tis my faith that every flower
Enjoys the air it breathes."
WORDSWORTH.

THE pressure brought to bear on every branch of industry in this rapidly moving nineteenth century has not failed to produce its effect on students of natural history; and comparatively few of the present active workers find time to leisurely ramble, observe, and philosophize, as, for example, Gilbert White did a century ago. Yet there is scarcely a lover of nature, however closely confined to his study or laboratory, who does not listen for the first twitter of the bluebird, or delight in the first bunch of violets brought by the spring, and find himself cheered by the chirp of the last robins, and the flowers of the witch-hazel, on the threshold of winter. For such and all lovers of nature, this effort to indicate the usual time at which a few typical plants of the different seasons may fairly be said to be coming into full bloom is made as a reminder of seasons that are gone, and a prompter for those to come.

Like the birds, flowers vary much in their habits. Some stay with us through the entire open season, and push their heads up at the very edge of the snow or in the heat of midsummer; some come at their appointed time, last but a few days or weeks, and disappear completely, be the season what it may; and others, usually regular in their blooming, feel the stimulus of a long, warm autumn, like the last, and anticipate the following spring by unfolding more or less profusely.

Every region has its own climatic peculiarities and its proper spring and autumn; and, though the limits of these may vary somewhat from year to year, there is usually some close observer of nature to be found, who prides himself on knowing a sheltered place where he is certain to find the trailing-arbutus or pasque-flower at about the same

date every year. But one spray of arbutus does not make a spring, and the lovely May-flower may not reach its prime of beauty and fragrance for some time after the most sheltered plants open their buds. Even in the same neighborhood, differences in exposure and elevation defy an exact tabulation of the periods of leafing, flowering, and fruiting; and the moderating influence of a body of water may retard the blooming of early species in its immediate vicinity for days or even weeks.

In a country covering nearly twenty-five degrees of latitude and fifty-five of longitude, with lofty mountains and tablelands and low valleys, diversified by great lakes and rivers, and embracing every variety of climate from the subtropical to the subarctic, with excesses of humidity in one region and of drought in another, it is impossible to arrange the phenomena of the seasons so as to include the whole.

On comparing the data obtainable, however, a few general features are found common to a great part of the country. Whatever their exact date of leafing or flowering may be, there are certain genera — like the maples, poplars, and elms among trees, and the violets and wakerobins among herbs — that precede most of their fellows; and, except in very anomalous seasons, their species succeed each other with the same regularity. Where the same plant extends from the Gulf to New England, it naturally blooms earlier in the warmer region; but it is noticeable that the difference, greatest in the flowers of early spring, becomes less marked as the season advances, under the accelerating heat of the northern summer, so that there is often little difference in the flowering of summer and autumnal plants. In general the same rule applies to species occurring over a considerable range of altitude, and is now and then illustrated nicely by a species with a wide distribution on both high and low ground.

FLORAL CALENDAR.[1]

Blooming all the year in favorable seasons. — Chickweed, dandelion (N.), Cherokee rose (Al.), Eschscholtzia, Anagallis (Cal.).

Jan. 1–10. — Ranunculus californicus (Cal.).

Jan. 10–20. — Ribes sanguineum (Cal.).

Jan. 20–30. — Red cedar (Al.).

Feb. 1–10. — Scoliopus (Cal.), red maple (Al.), Salix scouleriana (O.).

Feb. 10–20. — Trillium ovatum (Cal.), wild plum, trailing-arbutus (Al.).

Feb. 20–28. — Choke-berry, blue violet (Al.), Dentaria (O.).

March 1–10. — Cottonwood, sassafras (Al.), Nemophila Menziesii, Viola pedunculata (Cal.), Trillium ovatum (O.).

March 10–20. — Oaks, Pinus taeda (Al.), Phacelia tanacetifolia, Nemophila aurita (Cal.).

March 20–30. — Locust, flowering dogwood (Al.), Gilia multicaulis (Cal.), Ribes sanguineum (O.).

April 1–10. — Violets, Gilia achilleaefolia (Cal.), magnolia, wild cherry, Oxalis violacea (Al.), skunk-cabbage (N.).

April 10–20. — Gilia androsacea (Cal.), hickories (Al.), red maple, cottonwood, red cedar, pasque-flower (N.), Delphinium bicolor (Col.), Nardosmia palmata (C.), Erythronium (O.).

April 20–30. — Ceanothus thyrsiflorus (Cal.), poison sumach, blue flag (Al.), trailing-arbutus, sugar-maple (N.), Thlaspi alpestre (*Col.*), spring beauty (C.).

May 1–10. — Calochortus alba (Cal.), smooth sumach (Al.), ash, spring beauty, Erythronium, Trillium, golden currant (N.), spring beauty, pasque-flower (Col.), Clematis Douglasii (*Col.*).

May 10–20. — Calochortus Weedii (Cal.), sun-dews, New-Jersey tea (Al.), blue violet, wild plum, wild cherries (N.), Viola Nuttallii (Col.), Mertensia alpina (*Col.*), trailing-arbutus (C.).

May 20–30. — Calochortus pulchella (Cal.), sweet bay, dwarf palmetto (Al.), barberry, oaks, apple (N.), spring beauty (*Col.*), Trillium (C.).

June 1–10. — Lilium pardalinum (Cal.), St. Johns worts (Al.), blue flag, choke-berry (N.), Sophora sericea (Col.), golden currant (*Col.*), Calypso (C.).

June 10–20. — Mentzelia laevicaulis (Cal.), Virginia-creeper (Al.), raspberry, locust (N.), Lepachys columnaris (Col.), Anemone multifida (*Col.*).

June 20–30. — Rosa carolina (Al.), laurel, sun-dews, Aquilegia coerulea (N.), Delphinium azureum, Gilia aggregata (Col.), Zygadenus glaucus (*Col.*), Cypripedium acaule (C.).

July 1–10. — Sabbatia, Aster paludosus (Al.), Virginia-creeper, Rosa carolina (N.), Cleome integrifolia (Col.), pasque-flower (*Col.*).

July 10–20. — Gentiana oregana (Cal.), Habenaria ciliaris (Al.), New-Jersey tea, smooth sumach (N.), Pentstemon glabra (Col.), Gilia aggregata, Viola canina (*Col.*), Habenaria psycodes (C.).

[1] Based on the notes of Dr. Mohr for Mobile, Ala. (Al.); Professor Porter for middle Colorado (3-6,000 feet, Col.; 8-10,000 feet, *Col.*); Mr. Rattan for San Francisco, Cal. (Cal.); Mr. Hay for St. John, N.B. (C.); Mr. Howell for Oregon (O.); and the writer for Wisconsin and New York (N.).

July 20–30. — Rhexia, Zygadenus (Al.), poison sumach (N.), Grindelia squarrosa (Col.), Aquilegia coerulea (*Col.*), Lilium canadense (C.).

Aug. 1–10. — Zauschneria (Cal.), Petalostemon corymbosum (Al.), Sabbatia, Habenaria ciliaris (N.), Helianthus petiolaris (Col.), Erythronium grandiflorum (*Col.*), Rubus villosus (C).

Aug. 10–20. — Chrysolepis mariana (Al.), sun-flowers (N.), Malvastrum coccineum (Col.), Aster canescens (*Col.*), lovage (C.).

Aug. 20–30. — Lilium catesbaei, Liatris elegans (Al.), Solidago altissima (N.), Solidago missouriensis (Col.), Gentiana Parryi (*Col.*), Impatiens (C.), Aster Douglasii (O.).

Sept. 1–10. — Nabalus Frazeri (Al.), beech-drops, Liatris, Indian pipe (N.), Aster spectabilis (C.), golden-rods (O.).

Sept. 10–20. — Golden-rods (Al.), golden-rods, sow-thistle, Nabalus Frazeri (N.) (C.).

Sept. 20–30. — Gerardia purpurea (Al.), gentians, Acalypha (N.).

Oct. 1–10. — Aster tradescanti (Al.), asters (N.).

Oct. 10–20. — Gentiana ochroleuca (Al.).

Oct. 20–30. — Gentiana elliotii (Al.).

Nov. — Spiranthes brevifolia (Al.), witch-hazel (N.).

IMPORTANT AGRICULTURAL STATISTICS.

Live-stock in the United States in 1880, excluding ranch-stock, horses, mules, cows, and swine in cities, and those belonging to persons not owning or occupying farms.

Horses	10,357,981	Sheep	35,191,656
Cows (milch)	12,443,593	Swine	47,687,951
Other cattle	22,488,590		

The leading states in the raising of live-stock are as follows.

Illinois, horses	1,023,082
New York, milch-cows	1,437,855
Texas, other cattle	3,387,967
Ohio, sheep	4,902,486
Iowa, swine	6,034,316

Average yield per acre of cereals in the United States, 1880.

	Bush.		*Bush.*
Indian corn	28+	Barley	22+
Wheat	13–	Rye	10+
Oats	25+	Buckwheat	14–

Cereals raised in the United States in 1880.

	Bush.		*Bush.*
Indian corn	1,754,861,535	Barley	44,113,495
Wheat	559,479,505	Rye	19,831,595
Oats	407,858,999	Buckwheat	11,817,327

The leading states in the production of cereals.

	Bush.		*Bush.*
Illinois, Indian corn	325,793,481	Iowa, oats	30,610,591
Iowa, Indian corn	275,024,247	New York, oats	37,575,506
Missouri, Ind'n corn,	202,485,721	Pennsylvania, oats	33,841,439
Indiana, Indian corn,	115,482,300	Wisconsin, oats	32,905,320
Ohio, Indian corn	111,877,124	California, barley	12,579,561
Kansas, Indian corn,	105,729,325	Wisconsin, barley	5,043,118
Illinois, wheat	51,110,503	Pennsylvania, rye	3,683,621
Indiana, wheat	47,284,855	Illinois, rye	3,121,785
Ohio, wheat	46,014,869	New York, rye	2,634,690
Michigan, wheat	35,532,543	Wisconsin, rye	2,298,513
Minnesota, wheat	34,601,030	New York, buck-wheat	4,461,200
Iowa, wheat	31,154,205	Pennsylvania, buck-wheat	3,573,326
California, wheat	29,017,707		
Illinois, oats	63,189,200		

Average yield of corn and wheat per acre (in bushels).

	Corn.	*Wheat.*
Alabama	12+	6–
California	27+	15+
Massachusetts	35+	16+
New York	33+	15+
Illinois	36+	16–
Pennsylvania	33–	13+
Florida	9–	5+
Georgia	9+	7–
Minnesota	33+	11+

Implements and workmen.

Agricultural implements, number and value (1880).

Number of establishments	1,943
Number of hands employed	39,580
Capital invested	$62,109,668
Wages of workmen	15,359,610
Value of material	31,531,170
Value of implements manufactured	68,640,486
Number of reapers and mowers manufactured	162,337
Number of grain-cradles manufactured	167,492
Number of scythes manufactured	1,944,364
Number of horse-rakes manufactured	95,625

Farms.

Number of farms in the United States in 1880, 4,008,907.

States then having 200,000 and upwards.

Illinois	255,741	Missouri	215,575
Ohio	247,189	Pennsylvania	213,541
New York	241,058		

Cotton raised in 1880.

Total in the United States, 5,735,257 bales of 475 pounds each.

States producing 500,000 bales and upwards.

	Bales.		*Bales.*
Mississippi	955,808	Arkansas	608,236
Georgia	814,441	South Carolina	532,548
Texas	803,642	Louisiana	508,569
Alabama	699,654		

The extremes of production are Missouri, $\frac{60}{100}$ of a bale; Florida, $\frac{32}{100}$ per acre.

A FEW PERTINENT HINTS TO FARMERS.

Fences and farm-buildings.

SEASON fence-posts one year before using. Cut oak and cedar in February, chestnut and most other woods in August. To insure durability, soak the lower ends of posts in brine before setting. In the east the cost of fencing is equal to the value of the live-stock. To tear down a fence without splitting the boards, strike the side of the post near the top a sharp blow, in line with the fence, with a heavy sledge-hammer. To drive nails into very hard wood, dip their points in oil. Use steel nails for fencing. Paint in cool, cloudy weather. Use little lead and much oil for first coat. It does not pay to paint barns which are boarded vertically. Lime will remove moss from roofs.

Care of cattle.

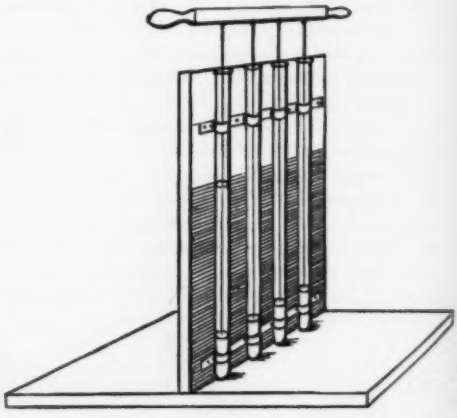
Try standing and lying on a hard plank floor twenty-three consecutive hours, and you will use the stanchions for kindlings, and build a covered barnyard. Feed cattle but twice daily, always before milking: give water as often, at a temperature of 55°; it is safer to scrimp food than water. Meal, if fed alone, especially to young calves, should be spread thinly on the bottom of troughs, so that it will be eaten slowly, and be insalivated. Allow one cubic foot of air-space for each pound of live weight. Temperature of cow-stables should range from 45° to 55°.

Hints on breeding.

Keep a mature thoroughbred bull at the head of the herd. Use selected common cows. Raise all female calves, and as many males as circumstances will admit, except badly marked or weak ones and those from two-year-old heifers. Uniformity in color, shape, and general characteristics, adds much to beauty and value. Heifers tried two years, if not satisfactory, should be fattened and sent to the shambles. Weigh the milk of each cow at least one day in each week. Stop guessing, and get facts. Selection, food, and care are the three great elements of success and improvement. Boys and cattle should be raised on the farm, not in the city.

Suggestions about dairying.

Procure a number of glass tubes, sixteen inches long, one inch in diameter, and closed at one end. With two strips of leather and tacks, fasten them upon a board two feet long and sixteen inches wide. Place under them a paper ten inches wide, ruled with lines a tenth of an inch apart. Fill each tube to the depth of ten inches with one cow's milk. The lines will designate the per cent of cream. Provide a metal dasher for each tube, and attach the handles of them to a common horizontal handle. Churn all the milk in the tubes at one operation, and note the per cent of butter in each tube. By this method it was proved, that, while one cow produced a hundred and eighty dollars' worth of milk in a year, another produced only forty dollars' worth. Nitrogenous foods,

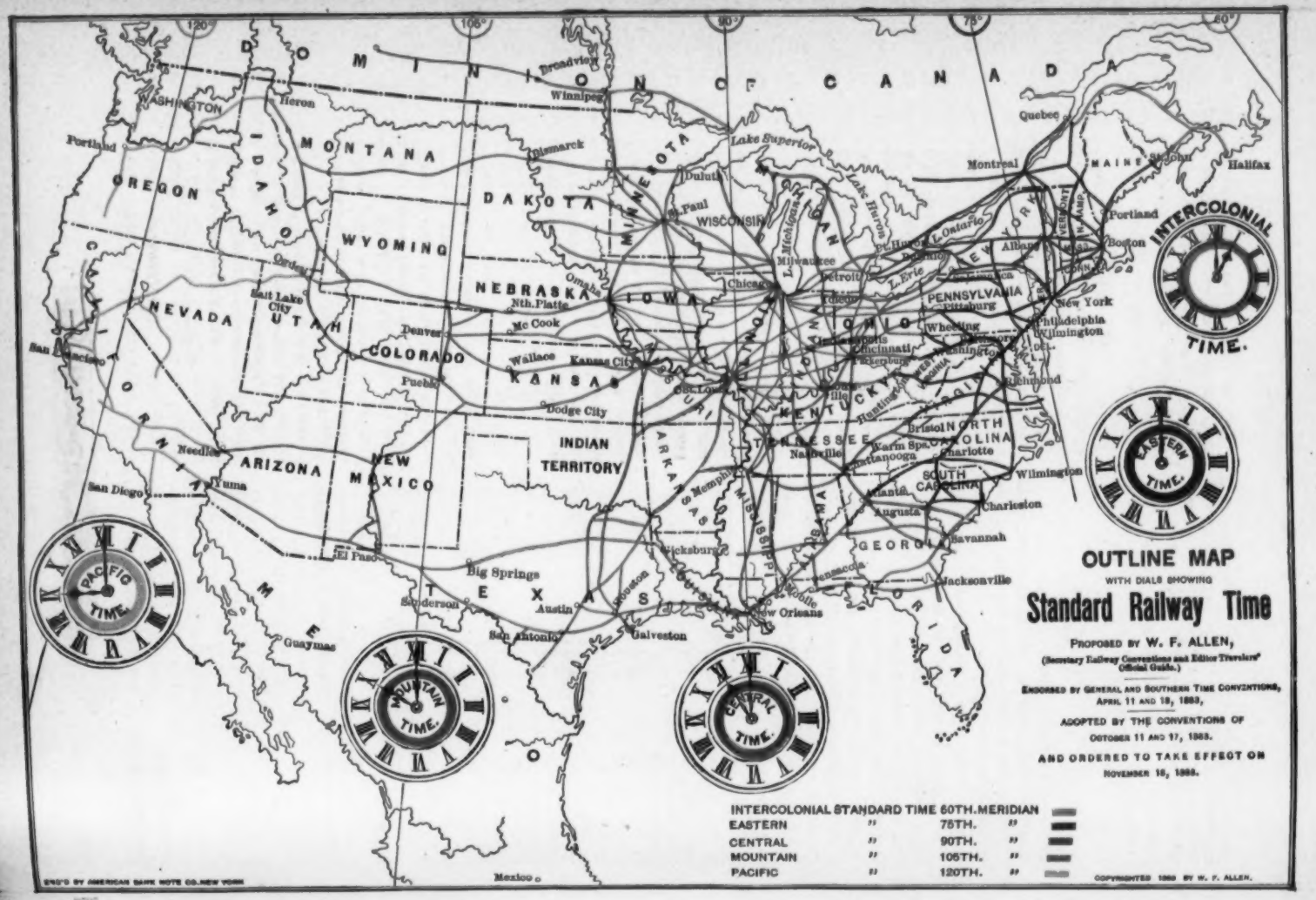


A CREAM-TESTER.

such as cottonseed-meal and clover-hay, tend to produce large quantities of milk, the butter from which is inclined to be oily. Heat-producing foods, such as corn-meal, do not tend to largely increase the flow of milk, but to improve the quality and quantity of the butter. Animals part with the fat of the body more easily than they extract fat from their food: hence it is economy to moderately fatten the cow when dry. Sweet skimmed milk is worth, to feed in connection with other food to a good breed of pigs, one cent per quart. Two quarts of milk drawn from the cow by the calf is worth three quarts fed to it from a pail. Calves are more cheaply raised in winter than in summer.

A few facts about manures.

The value of the manure of a thousand-pound cow, liberally fed, ranges from five to ten cents per day, exclusive of bedding. Milch-cows take from their food about twenty per cent of its manurial value; fattening stock, about five per cent; young animals and dry cows, ten per cent.


OUTLINE MAP
WITH DIALS SHOWING
Standard Railway Time
PROPOSED BY W. F. ALLEN,
(Secretary Railway Conventions and Editor Travelers' Official Guide.)
ENDORSED BY GENERAL AND SOUTHERN TIME CONVENTIONS, APRIL 11 AND 19, 1883,
ADOPTED BY THE CONVENTIONS OF OCTOBER 11 AND 17, 1883.
AND ORDERED TO TAKE EFFECT ON NOVEMBER 18, 1883.
INTERCOLONIAL STANDARD TIME 60TH. MERIDIAN
EASTERN " 75TH. "
CENTRAL " 90TH. "
MOUNTAIN " 105TH. "
PACIFIC " 120TH. "
INTERCOLONIAL TIME.
EASTERN TIME.
CENTRAL TIME.
MOUNTAIN TIME.
PACIFIC TIME.
DOMINION OF CANADA
MONTANA
DAKOTA
WYOMING
NEBRASKA
IOWA
NEVADA
UTAH
COLORADO
KANSAS
ARIZONA
NEW MEXICO
INDIAN TERRITORY
TEXAS
MAINE
Portland
Boston
New York
Philadelphia
Wilmington
Washington
Richmond
Wilmington
Charleston
Savannah
Jacksonville
New Orleans
Galveston
San Antonio
El Paso
Big Springs
Denver
Omaha
Chicago
Milwaukee
Detroit
Cleveland
Pittsburg
Cincinnati
Louisville
Nashville
Atlanta
Augusta
Charlotte
Montreal
Quebec
Halifax
Winnipeg
Portland
San Francisco
San Diego
Yuma
Needles
Salt Lake City
Ogden
Pueblo
Dodge City
Wallace
Kansas City
St. Louis
Memphis
Vicksburg
Mobile
Pensacola
Duluth
St. Paul
Bismarck
Broadview
Heron
Mexico

CHRONOLOGICAL CYCLES, 1885.

Dominical letter	D
Epact	14
Lunar cycle or Golden number	5
Solar cycle	18
Roman indiction	13
Julian period	6598

FIXED AND MOVABLE FESTIVALS OF THE CHURCH, 1885.

Epiphany	Jan. 6.
Septuagesima Sunday	Feb. 1.
Quinquagesima (Shrove Sunday)	Feb. 15.
Ash Wednesday	Feb. 18.
First Sunday in Lent	Feb. 22.
St. Patrick	March 17.
Palm Sunday	March 29.
Good Friday	April 3.
Easter Sunday	April 5.
Low Sunday	April 12.
Rogation Sunday	May 10.
Ascension Day (Holy Thursday)	May 14.
Pentecost (Whit Sunday)	May 24.
Trinity Sunday	May 31.
Corpus Christi	June 4.
St. John Baptist (Midsummer Day)	June 24.
Michaelmas Day	Sept. 29.
First Sunday in Advent	Nov. 29.
Christmas Day	Dec. 25.

MORNING AND EVENING STARS, 1885.

MERCURY will be visible as morning-star about Jan. 26, May 25, and Sept. 15; and as evening-star about April 8, Aug. 6, and Nov. 30.

VENUS will be morning-star till May 4, then evening-star the rest of the year.

MARS will be evening-star till Feb. 11, then morning-star the rest of the year.

JUPITER will be morning-star till Feb. 18, then evening-star till Sept. 8, and morning-star again the rest of the year.

SATURN will be evening-star till June 18, then morning-star till Dec. 26, and evening-star again the rest of the year.

SEASONS, 1885.

(Eastern standard.)

Spring begins	March 20, 5h	A.M.
Summer "	June 21, 2h	A.M.
Autumn "	Sept. 22, 4h	P.M.
Winter "	Dec. 21, 10h	A.M.

TIDE TABLE.

THE table of tides is limited to points on the Atlantic coast, as the tides on the Pacific coast are of so complicated a character that it would be impossible to refer to them by the simple table of reduction as given. The actual times of the occurrence of high and low water are much affected by the force of the wind, a difference of fifteen minutes between prediction and observation often being brought about.

Intervals to be applied to the standard time of high water at New York, found in the calendar pages.	Correction to New York (standard time) tide to obtain tide in standard time elsewhere.		Mean range.
	H.	M.	FEET.
Eastport, Me.	Add 3	33	18.2
Mount Desert Island, Me.	" 2	32	9.9
Belfast, Me.	" 2	38	9.7
Portland, Me.	" 2	55	9.1
Portsmouth, N.H.	" 3	3	8.6
Newburyport, Mass.	" 3	17	7.5
Ipswich, Mass.	" 3	6	9.0
Rockport, Mass.	" 2	36	8.6
Gloucester, Mass.	" 2	44	8.9
Marblehead, Mass.	" 2	51	9.3
Salem, Mass.	" 2	54	9.2
Plymouth, Mass.	" 2	59	10.2
Provincetown, Mass.	" 2	59	9.2
Hyannis, Mass.	" 4	0	3.3
Nantucket, Mass.	" 4	15	3.0
Vineyard Haven, Mass.	" 3	22	1.6
Wood's Holl (north side), Mass.	Sub. 0	21	4.0
Wood's Holl (south side), Mass.	Add 0	14	1.6
New Bedford entrance (Dumpling R.), Mass.	Sub. 0	20	3.7
Fall River, Mass.	" 0	8	4.7
Newport, R.I.	" 0	33	3.9
Point Judith, R.I.	" 0	45	3.1
Montauk Point, R.I.	Add 0	4	1.9
Watch Hill, R.I.	" 0	44	2.7
Stonington, Conn.	" 0	52	2.7
New London, Conn.	" 1	12	2.5
Norwich, Conn.	" 1	57	3.1
New Haven, Conn.	" 2	57	6.0
Bridgeport, Conn.	" 3	1	6.5
New Rochelle, N.Y.	" 3	14	7.6
West Point, N.Y.	" 2	55	2.7
Albany and Greenbush, N.Y.	Sub. 2	48	2.3
Brooklyn (navy-yard), N.Y.	Add 0	47	4.4
Newark, N.J.	" 0	46	5.0
Sandy Hook, N.J.	Sub. 0	36	4.7
Barnegat, N.J.	Add 1	38	0.9
Cape May Landing, N.J.	" 0	16	4.8
Delaware Breakwater, Del.	Sub. 0	3	3.5
Delaware City, Del.	Add 2	59	6.3
New Castle, Del.	" 3	52	6.5
Philadelphia, Penn.	" 5	42	6.0
Annapolis, Md.	Sub. 3	19	0.9
Baltimore, Md.	" 1	24	1.3
Havre de Grace, Md.	Add 1	38	1.5
Point Lookout, Md.	" 4	58	1.4
Washington (Long Bridge), D.C.	Sub. 0	20	2.8
Norfolk (navy-yard), Va.	Add 1	5	2.7
Richmond, Va.	Sub. 3	25	3.6
Hatteras Inlet, N.C.	" 0	56	2.0
Beaufort, N.C.	" 0	35	2.8
Wilmington, N.C.	Add 1	15	2.7
Smithville, N.C.	Sub. 0	35	4.4
Charleston (new Custom-House wharf), S.C.	" 0	19	5.1
Beaufort, S.C.	" 0	42	7.3
Savannah (dry dock), Ga.	" 0	23	6.5
Fernandina, Fla.	" 0	44	6.1
St. John's River (entrance), Fla.	" 1	1	5.3
St. Augustine, Fla.	" 0	17	4.1
Cape Florida, Fla.	" 0	9	1.3
Key West, Fla.	Add 1	4	1.2
Cedar Keys, Fla.	" 4	52	1.9

ECLIPSES, 1885.

In the year 1885 there will be four eclipses,—two of the sun, and two of the moon.

I. An annular eclipse of the sun, March 16; visible in North America generally as a partial eclipse,—being annular within a belt 35 miles wide, drawn through Weaverville and Fort Bidwell, Cal.; Idaho and Boise Cities, Idaho; Bannack City and Gallatin, Montana; Hudson Bay and Greenland,—occurring as follows:—

Standard time:	Begins.	Ends.	Annular.
	H. M.	H. M.	H. M.
Bangor, Me.	0 23 A.	2 58 A.	– –
Boston, Mass.	0 20 A.	2 53 A.	– –
New York, N.Y.	0 13 A.	2 46 A.	– –
Philadelphia, Penn.	0 10 A.	2 43 A.	– –
Buffalo, N.Y.	0 2 A.	2 42 A.	– –
Pittsburg, Penn.	11 58 M.	2 38 A.	– –
Cincinnati, O.	10 48 M.	1 29 A.	– –
Chicago, Ill.	10 45 M.	1 30 A.	– –
Nashville, Tenn.	10 41 M.	1 22 A.	– –
St. Louis, Mo.	10 37 M.	1 20 A.	– –
Omaha, Neb.	10 28 M.	1 15 A.	– –
Baltimore, Md.	0 7 A.	2 40 A.	– –
Washington, D.C.	0 6 A.	2 39 A.	– –
Charleston, S.C.	11 57 M.	2 24 A.	– –
Savannah, Ga.	10 54 M.	1 21 A.	– –
Jacksonville, Fla.	10 53 M.	1 17 A.	– –
Raleigh, N.C.	0 0 A.	2 31 A.	– –
Mobile, Ala.	10 33 M.	1 11 A.	– –
New Orleans, La.	10 28 M.	1 8 A.	– –
Memphis, Tenn.	10 33 M.	1 15 A.	– –
Galveston, Tex.	10 15 M.	1 0 A.	– –
St. Paul, Minn.	10 38 M.	1 25 A.	– –
Denver, Col.	9 10 M.	0 1 A.	– –
Salt Lake City, Utah	9 3 M.	11 52 M.	– –
Santa Fé, N. Mex.	9 3 M.	11 53 M.	– –
San Francisco, Cal.	7 48 M.	10 30 M.	– –
Portland, Ore.	8 2 M.	10 41 M.	– –
Boise City, Idaho	9 3 M.	11 49 M.	10 23 M.
Bannack, Montana	9 8 M.	11 57 M.	10 30 M.
Weaverville, Cal.	7 52 M.	10 33 M.	9 8 M.
Fort Bidwell, Cal.	7 57 M.	10 39 M.	9 14 M.

Duration of annulus, from $\frac{1}{2}$ to $\frac{3}{4}$ of a minute.

II. A partial eclipse of the moon, March 30; invisible in America; visible in Asia, Australia, eastern portions of Europe and Africa, and the western Pacific Ocean.

III. A total eclipse of the sun, Sept. 8; invisible in North America; visible chiefly in the South Pacific Ocean.

IV. A partial eclipse of the moon, Sept. 23, 24; visible in North and South America and the Atlantic and Pacific Oceans, happening as follows:—

Standard time:	Eastern.	Central.	Mountain.	Pacific.
	D. H. M.	D. H. M.	D. H. M.	D. H. M.
Moon enters penumbra	24 0 0 M.	23 11 0 A.	23 10 0 A.	23 9 0 A.
Moon enters shadow	24 1 14 M.	24 0 14 M.	23 11 14 A.	23 10 14 A.
Middle of the eclipse	24 2 48 M.	24 1 48 M.	24 0 48 M.	23 11 48 A.
Moon leaves shadow	24 4 22 M.	24 3 22 M.	24 2 22 M.	24 1 22 M.
Moon leaves penumbra	24 5 36 M.	24 4 36 M.	24 3 36 M.	24 2 36 M.

Magnitude of eclipse = 0.79 (moon's diameter = 1).

SYMBOLS.

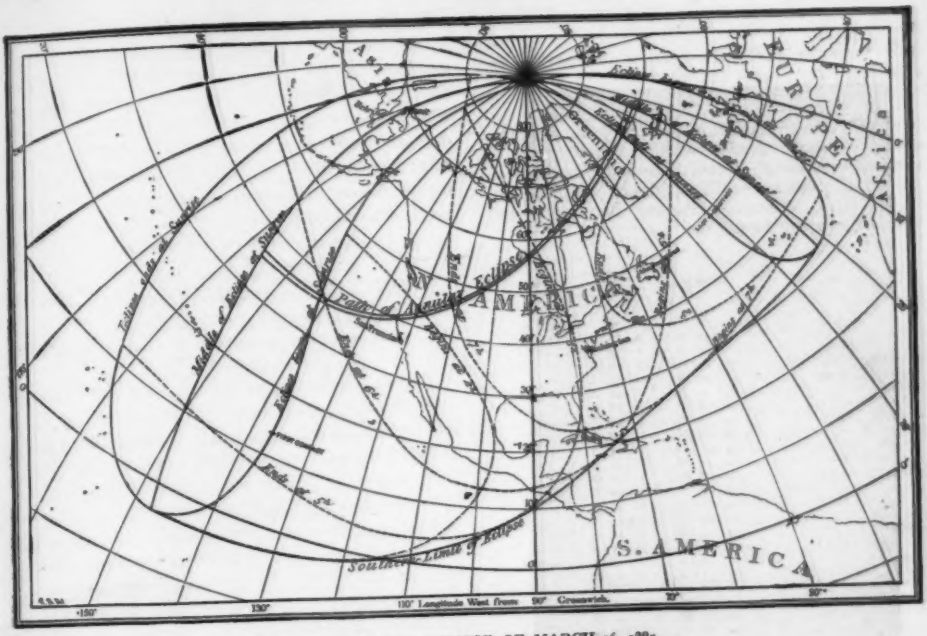
☉ . . . The Sun.	♂ . . . Mars.
☾ . . . The Moon.	♃ . . . Jupiter.
☿ . . . Mercury.	♄ . . . Saturn.
♀ . . . Venus.	♅ . . . Uranus.
⊕ . . . The Earth.	♆ . . . Neptune.

☗ . . . Moon runs high.
☖ . . . Moon runs low.
☌ . . . Conjunction, or having the same longitude or right ascension.
□ . . . Quadrature, or differing 90° in longitude or right ascension.
☍ . . . Opposition, or differing 180° in longitude or right ascension.
☊ . . . Ascending node.
☋ . . . Descending node.
S . . . Appended to the stars, 'souths,' or crosses the meridian.

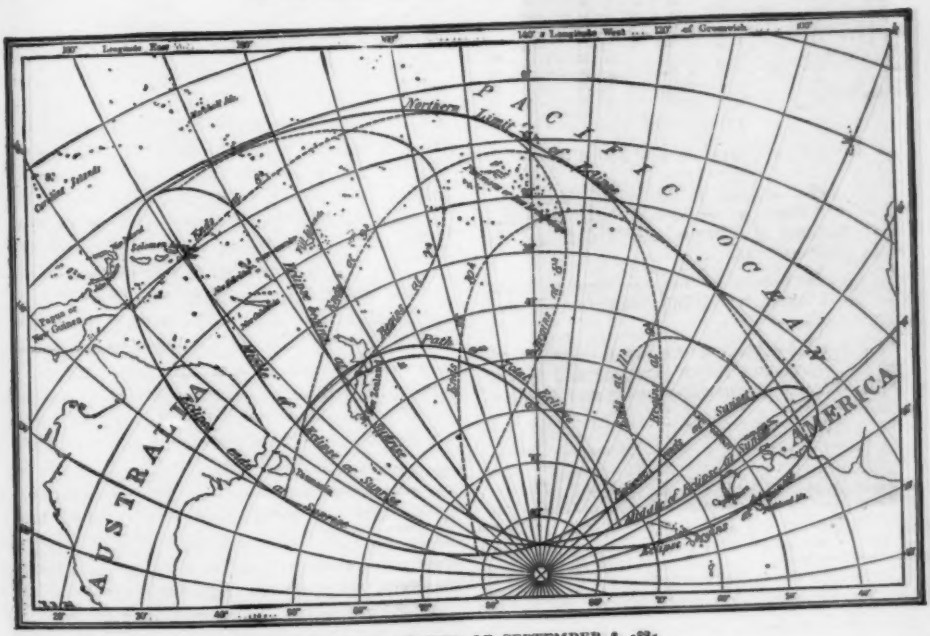
♈ . . . Aries.	♎ . . . Libra.
♉ . . . Taurus.	♏ . . . Scorpio.
♊ . . . Gemini.	♐ . . . Sagittarius.
♋ . . . Cancer.	♑ . . . Capricornus.
♌ . . . Leo.	♒ . . . Aquarius.
♍ . . . Virgo.	♓ . . . Pisces.

SUN-TIME AND CLOCK-TIME.

One very often hears some friend say, when extolling the merits of his watch, that he sets the sun by it. It is doubtless supposed by many that the sun is most regular in its habits, and crosses the meridian exactly at noon; and it was with a feeling of regret at parting company with a so-supposed faithful time-keeper, that many set their watches to standard time on the 19th of November, 1883. If the orbit of the earth were perfectly circular, and the sun revolved around an axis perpendicular to the plane of the orbit, then the sun would have the reliable character with which it is now credited; but, unfortunately, the orbit is not circular, and the earth revolves about an axis inclined to the plane of the orbit, so that the apparent motion of the sun varies in rate from time to time through the year. And as it is convenient for us to have our days of equal length, the mean time to which we set our clocks differs from solar time by as much as fifteen minutes on the 10th of February, and fully sixteen minutes on the 27th of October. The relation between mean time (the time we use on our clocks and watches) and solar or apparent time (that of the sun-dial) is readily



ANNULAR SOLAR ECLIPSE OF MARCH 16, 1885.



TOTAL SOLAR ECLIPSE OF SEPTEMBER 8, 1885.

seen from the accompanying diagram; and what is meant by the equation of time, which is nothing more than the difference between mean time and solar time, may be seen by a glance, and is given by the length of a horizontal line running from the vertical line through the zero of the scale, to a point on the curve corresponding to the date for which the equation of time is desired. For all ordinary purposes, the diagram is sufficiently accurate; although, of course, it has not all the refinements which might be suggested, as, in fact, a single diagram could not be given for all years.

DIAGRAM SHOWING COMPARISON OF MEAN (OR CLOCK) TIME WITH SOLAR (OR APPARENT) TIME AT THE SEVERAL SEASONS OF THE YEAR. THE PERPENDICULAR CENTRAL LINE REPRESENTS MEAN TIME, AND THE CURVED LINE SOLAR TIME, AT MEAN NOON. (Borrowed, by permission, from the *Popular science monthly*.)

NEW MAPS OF THE HEAVENS.

"Nature and Nature's laws lay hid in night.
God said, 'Let Newton be!' and all was light."
POPE.

THE accompanying maps represent the heavens from the north pole to 30° south of the equator, and include all stars to the 4¼ magnitude inclusive. In some instances those of the 4½ magnitude have been incorporated for the sake of configuration, and convenience of identification.

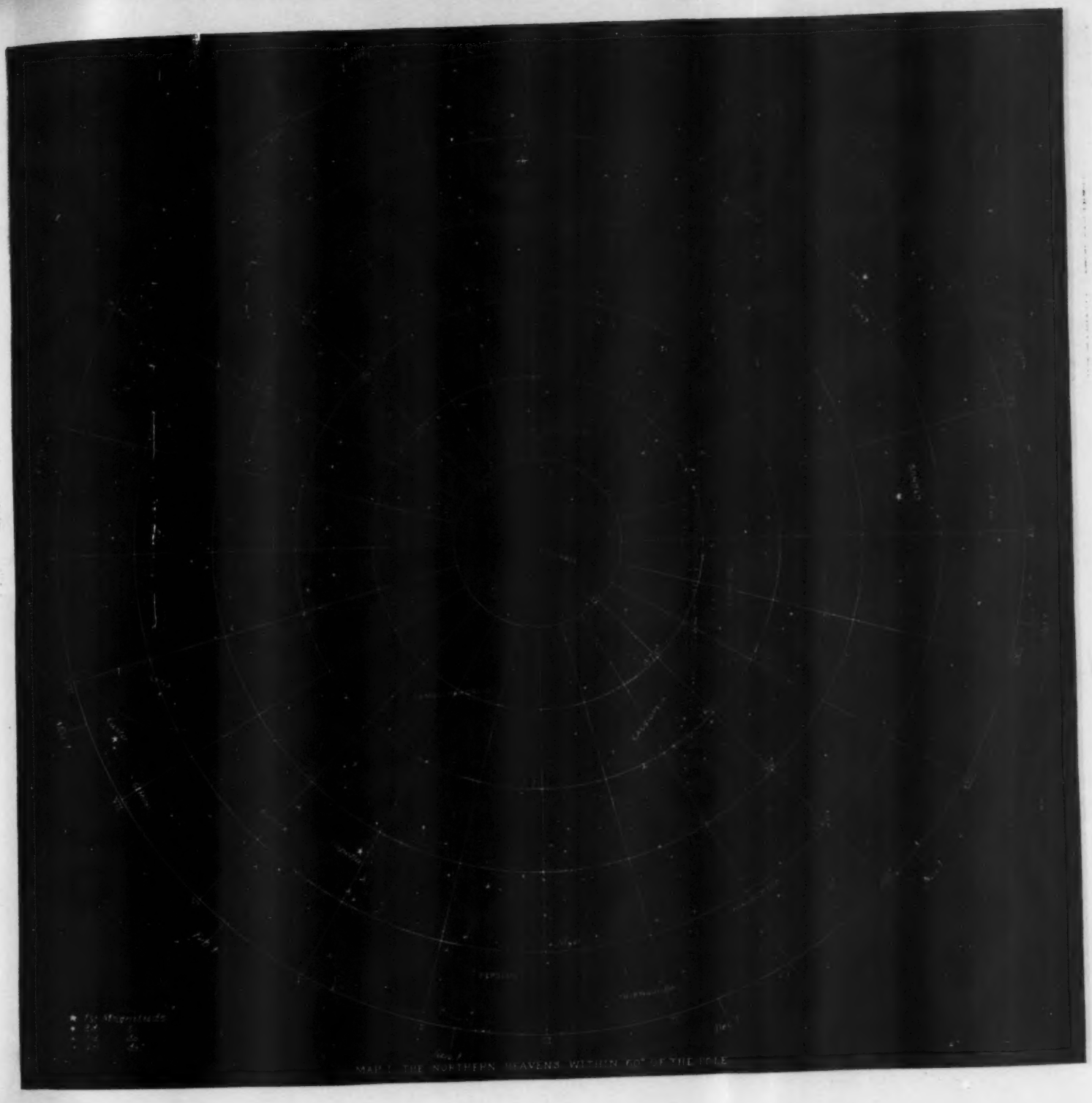
The maps also include portions of the milky way, the paths of the planets during the year, with their location in these paths at certain definite intervals. From these the position of any planet for any date can be obtained with sufficient accuracy for finding-purposes.

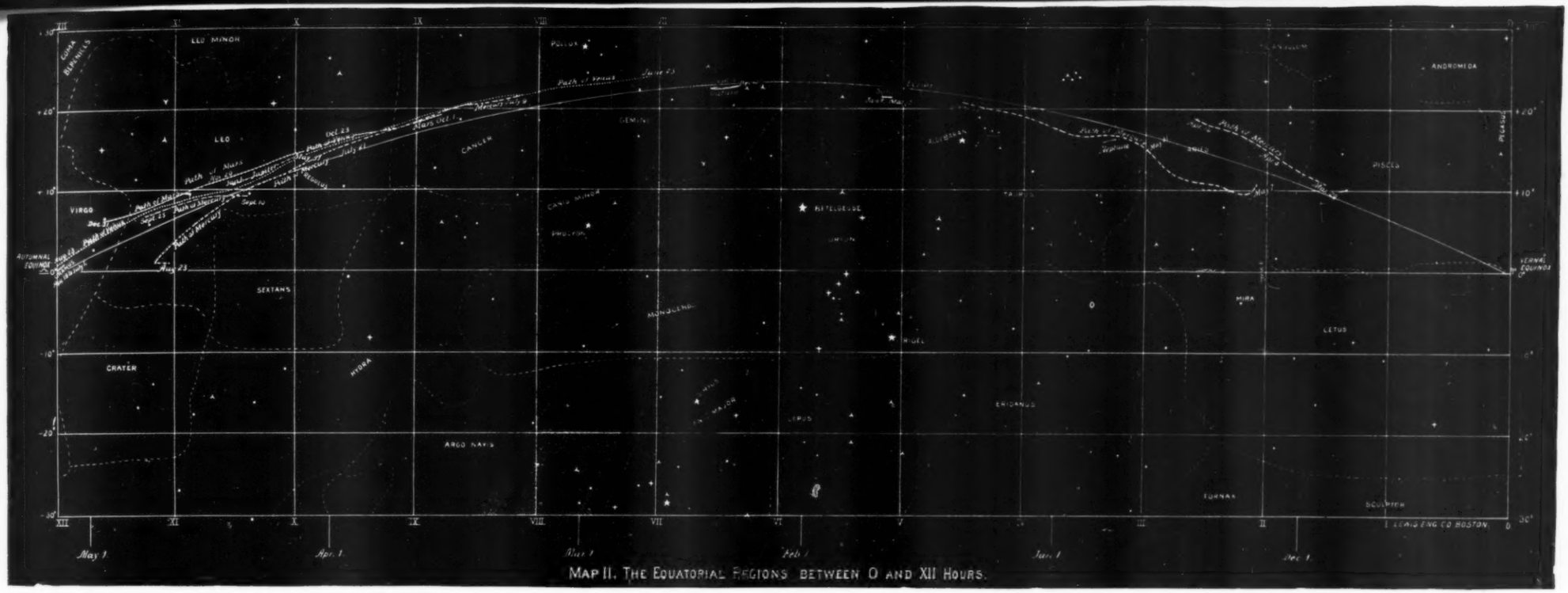
The numbers around the circumference of the circular map, and at the top and bottom of the rectangular maps, indicate hours of right ascension; and the other figures along the line of 0 and 12 hours, every ten degrees of declination. The curving line represents the ecliptic or apparent path of the sun in the heavens.

The months at the borders indicate the part of the heavens that would be on the meridian at nine o'clock in the evening at the various times expressed. Thus, on Jan. 1, the stars along the line of 3.7 hours would be crossing the meridian at nine o'clock in the evening, and on Feb. 1 those on the meridian of 5.8 hours, etc.

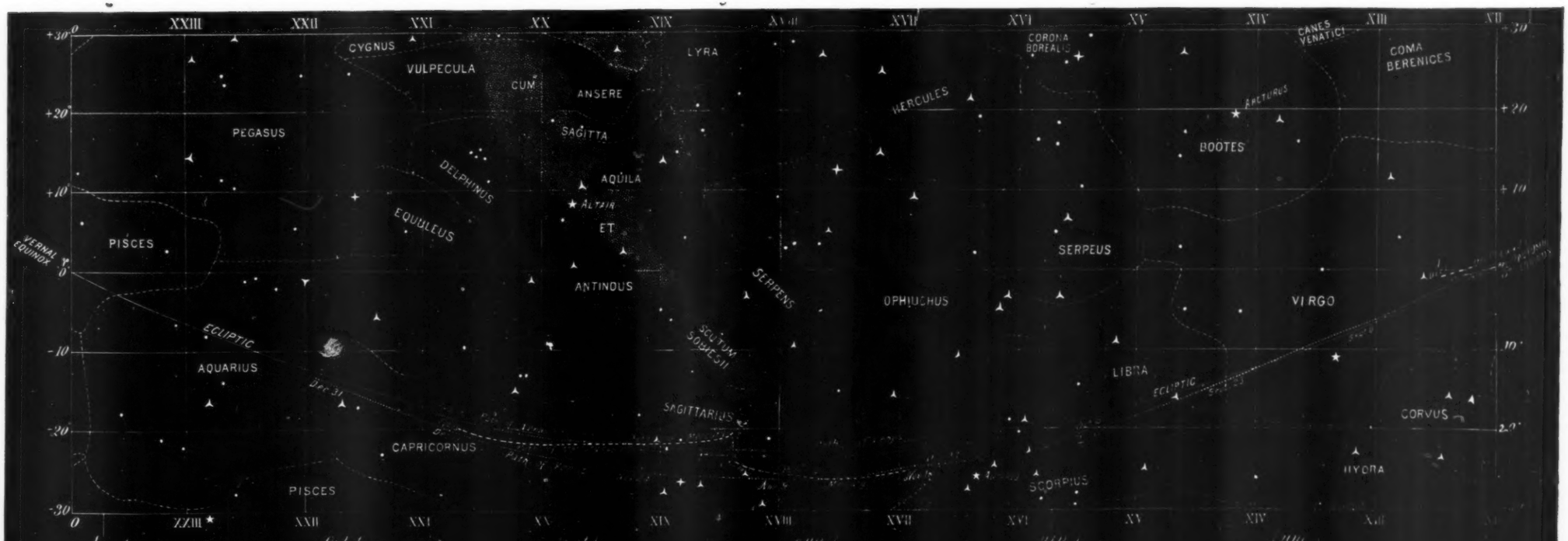
RATES OF DOMESTIC POSTAGE.

Letters and all other written matter, whether sealed or unsealed, and all other matter sealed, nailed, sewed, tied, or fastened in any manner, so that it cannot be easily examined, per half-ounce, or fraction thereof, 2 cents; ***postal-cards***, each 1 cent; ***printed matter*** (except newspapers and periodicals), in unsealed wrappers only, each two ounces, or fraction thereof, 1 cent (limit of weight four pounds, except for a single book, which may weigh more; prepayment compulsory); ***newspapers and periodicals***, in unsealed wrappers, each four ounces, or fraction thereof, 1 cent; mailable ***merchandise***, in packages easily opened for examination, per ounce, or fraction thereof, 1 cent (limit of weight four pounds; prepayment compulsory); registration-fee on letters or other articles, 10 cents.

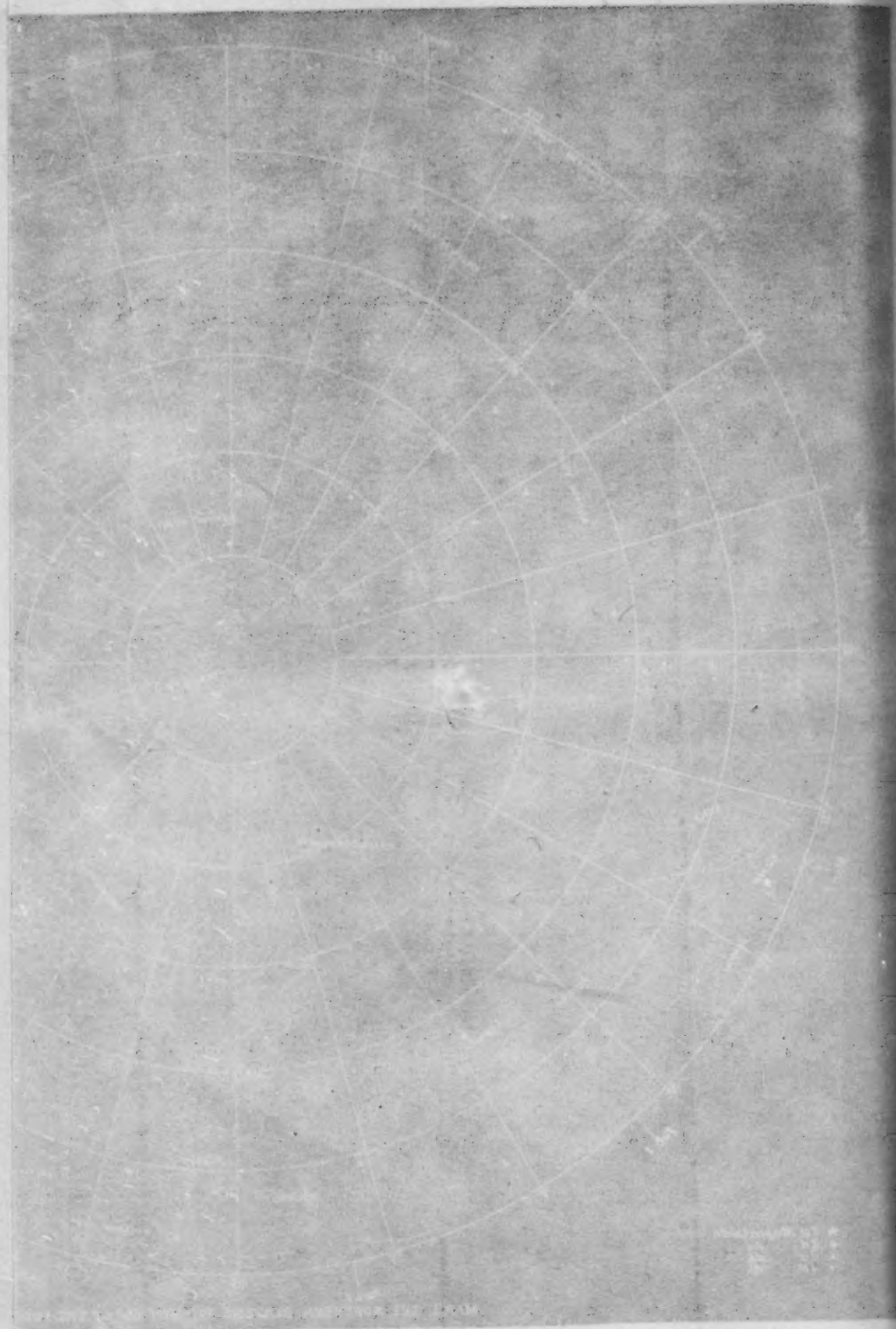




MAP II. THE EQUATORIAL REGIONS BETWEEN O AND XII HOURS.



MAP III THE EQUATORIAL REGIONS BETWEEN XII AND XXIV HOURS



MAP II. The Equatorial Zone between 0 and VI Hours.

STANDARD TIME.

FOR the convenience of the travelling public, there have been adopted by the railroads of the United States and the Dominion of Canada, and to a certain extent by the municipalities of the two countries, five different standards of time, extending from Nova Scotia to the Pacific coast, being as follows: —

NAME.	Central meridian.
Intercolonial	$60° = 4^h$ west from Greenwich.
Eastern	$75° = 5^h$ " " "
Central	$90° = 6^h$ " " "
Mountain	$105° = 7^h$ " " "
Pacific	$120° = 8^h$ " " "

The calculations of this almanac are given in *local mean time*, except where otherwise stated. To change to 'standard time,' apply a *plus* or *minus* correction, to be found by subtracting the central longitude of the adopted standard from the longitude of the place, reduced to time.

For example: the standard of Boston is the 'Eastern' one, carrying (as per schedule above) the longitude of 75°, or 5 hours, which, subtracted from Boston's longitude, $71° 4' = 4^h 44^m$, gives a *minus* result of 3° 56′, or 16 minutes, to be *subtracted* from the printed mean-time values for Boston.

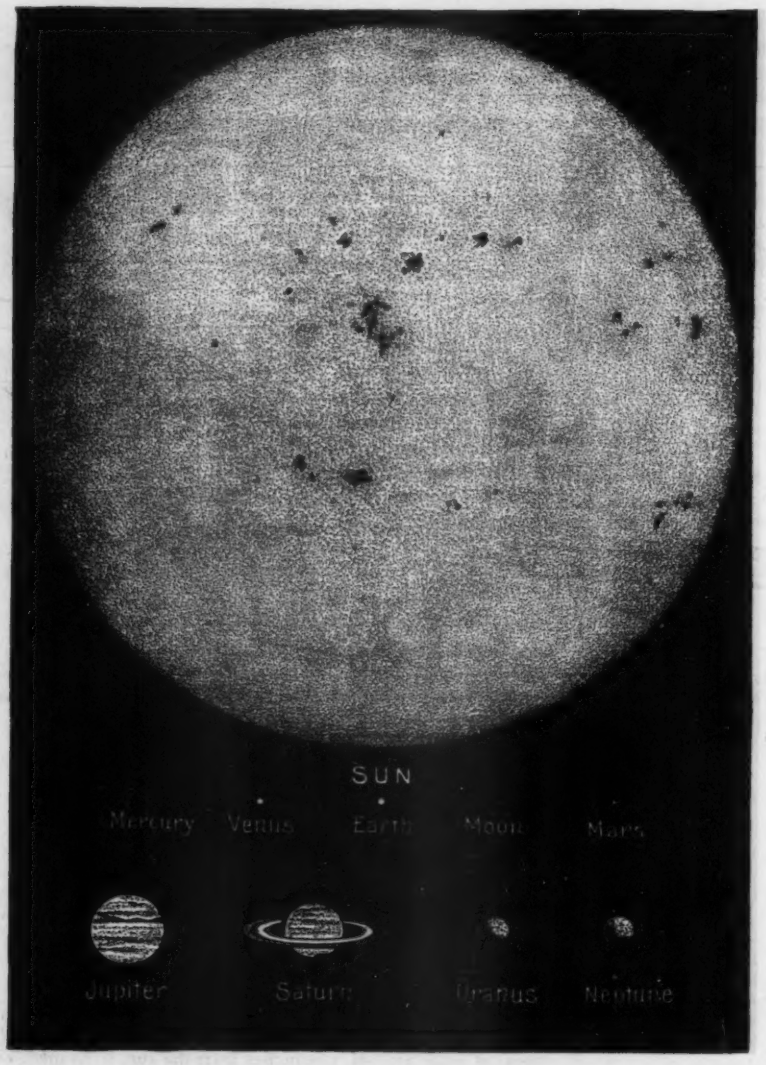
Again: the standard for St. Paul — the 'Central' one — is 6 hours, which, subtracted from St. Paul's longitude of $6^h 12^m$, leaves a correction of 12 minutes to be *added*, in order to change to St. Paul's standard.

The following table gives the correction for a number of the principal cities of the continent: —

STANDARD TIME-TABLE.

Correction to be applied to local mean time to obtain standard time.

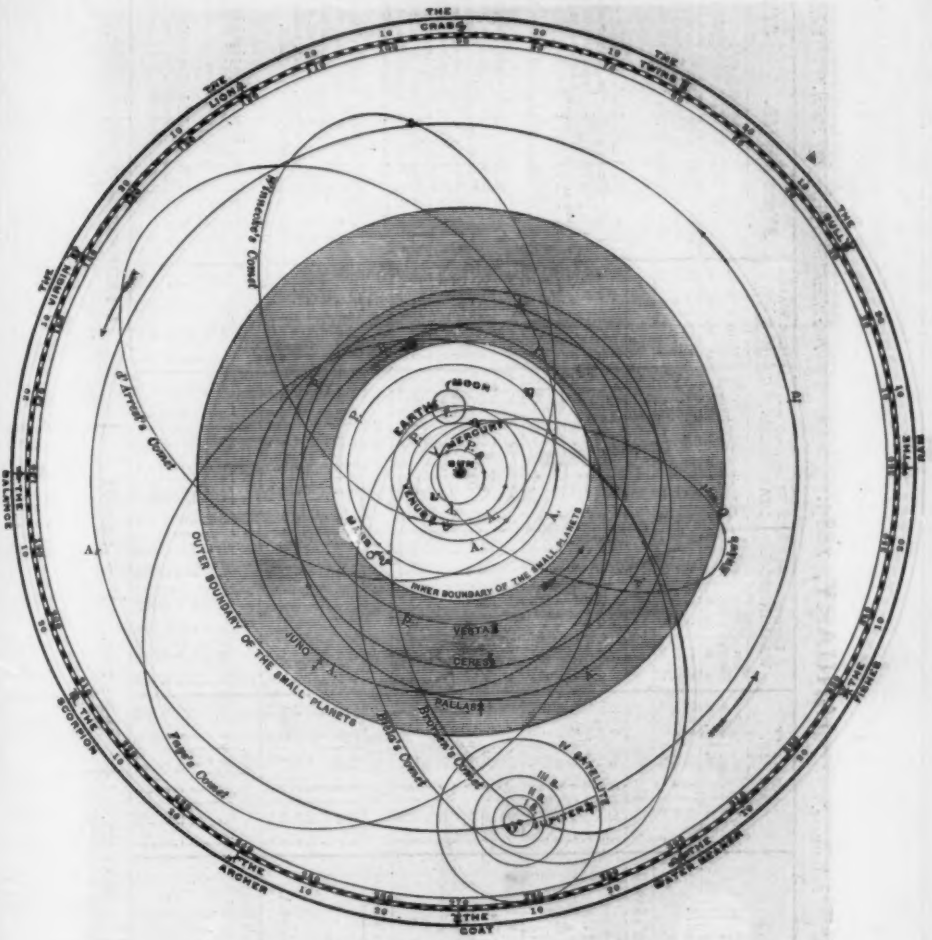
	Standard.	Correction.		Standard.	Correction.		Standard.	Correction.
		M.			M.			M.
Eastport, Me.	Intercolonial.	+28	Erie, Penn.	Central.	−40	Jacksonville, Fla.	Central.	−33
Bangor, Me.	Eastern.	−25	Cleveland, O.	"	−33	Pensacola, Fla.	"	−11
Augusta, Me.	"	−21	Columbus, O.	"	−28	Lexington, Ky.	"	−23
Portland, Me.	"	−19	Toledo, O.	"	−26	Louisville, Ky.	"	−18
Concord, N.H.	"	−14	Cincinnati, O.	"	−22	Knoxville, Tenn.	"	−24
Manchester, N.H.	"	−14	Detroit, Mich.	"	−28	Nashville, Tenn.	"	−13
Montpelier, Vt.	"	−10	Lansing, Mich.	"	−22	Memphis, Tenn.	"	−
Burlington, Vt.	"	− 7	Grand Haven, Mich.	"	−15	Montgomery, Ala.	"	−15
Boston, Mass.	"	−16	Fort Wayne, Ind.	"	−19	Huntsville, Ala.	"	−13
Springfield, Mass.	"	−10	Indianapolis, Ind.	"	−16	Mobile, Ala.	"	− 8
Northampton, Mass.	"	− 9	Chicago, Ill.	"	−10	Holly Springs, Miss.	"	− 2
Newport, R.I.	"	−15	Cairo, Ill.	"	− 3	Jackson, Miss.	"	+ 1
Providence, R.I.	"	−14	Springfield, Ill.	"	− 2	New Orleans, La.	"	−
Hartford, Conn.	"	− 9	Galena, Ill.	"	+ 2	Shreveport, La.	"	+15
New Haven, Conn.	"	− 8	Quincy, Ill.	"	+ 6	Little Rock, Ark.	"	+ 9
Albany, N.Y.	"	− 5	Milwaukee, Wis.	"	− 8	Fort Gibson, Ind. Ter.	"	+21
New York, N.Y.	"	− 4	Janesville, Wis.	"	− 4	Galveston, Tex.	"	+19
Utica, N.Y.	"	+ 1	Madison, Wis.	"	− 3	Houston, Tex	"	+21
Syracuse, N.Y.	"	+ 5	Superior City, Wis.	"	+ 8	Dallas, Tex.	"	+27
Rochester, N.Y.	"	+ 11	Dubuque, Io.	"	+ 3	Austin, Tex.	"	+31
Buffalo, N.Y.	"	+16	Davenport, Io.	"	+ 3	San Antonio, Tex.	"	+34
Newark, N.J.	"	− 3	Des Moines, Io.	"	+14	Cheyenne, Wyoming.	Mountain.	− 1
Trenton, N.J.	"	− 1	Duluth, Minn.	"	+ 9	Denver, Col.	"	−
Philadelphia, Penn.	"	+ 1	St. Paul, Minn.	"	+12	Santa Fé, N. Mex.	"	+ 4
Harrisburg, Penn.	"	+ 7	Minneapolis, Minn.	"	+13	Helena, Montana	"	+28
Pittsburg, Penn.	"	+20	St. Louis, Mo.	"	+ 1	Salt Lake City, Utah	"	+28
Wilmington, Del.	"	+ 2	Jefferson City, Mo.	"	+ 9	Virginia City, Nev.	Pacific.	− 2
Baltimore, Md.	"	+ 6	Kansas City, Mo.	"	+18	San Diego, Cal.	"	−11
Washington, D.C.	"	+ 8	St. Joseph, Mo.	"	+19	Sacramento, Cal.	"	+ 6
Norfolk, Va.	"	+ 5	Lawrence, Kan.	"	+21	San Francisco, Cal.	"	+10
Richmond, Va.	"	+10	Topeka, Kan.	"	+23	Olympia, Wash. Ter.	"	+11
Lynchburg, Va.	"	+17	Omaha, Neb.	"	+24	Portland, Ore.	"	+11
Wheeling, W. Va.	"	+23	Lincoln, Neb.	"	+27		"	−
Wilmington, N.C.	"	+12	Yankton, Dakota	"	+29	Quebec, Quebec	Eastern.	−15
Raleigh, N.C.	"	+15	Bismark, Dakota	"	+43	Montreal, Quebec	"	− 6
Charleston, S.C.	"	+20	Savannah, Ga.	"	−36	Ottawa, Ontario	"	+ 3
Columbia, S.C.	"	+24	Milledgeville, Ga.	"	−27	Toronto, Ontario	"	+18



THE SUN AND THE PLANETS, THEIR COMPARATIVE DIMENSIONS.

THE accompanying illustration (borrowed from Guillemin's 'Le ciel') shows at a glance the relative size of the sun and planets. The sun is represented in an abnormally spotted condition, it being doubtful whether he ever displays so pitted a face. The small planets, or asteroids, one or more of which are discovered each month, could not be represented on so small a scale, as they would be invisible, the actual diameters of some not being more than a few miles. The overwhelming size of the sun is well brought out; its volume is six hundred times that of all the planets; and, if placed in a balance, it would outweigh seven hundred and forty times their total mass. The following table shows the relative masses and densities of the planets:—

PLANETS.	MASS.	DENSITY.	PLANETS.	MASS.	DENSITY.	PLANETS.	MASS.	DENSITY.	PLANETS.	MASS.	DENSITY.
Mercury	0.075	1.376	Earth	1.000	1.000	Jupiter	309.028	0.243	Uranus	18.542	0.220
Venus	0.787	0.905	Mars	0.109	0.692	Saturn	92.394	0.133	Neptune	15.771	0.211



MAP OF THE SOLAR SYSTEM.

THE orbits of the five inner planets and of many of the periodic comets are given in the accompanying diagram, which is drawn approximately to scale, the orbits of the satellites being enlarged to prevent confusion. Saturn would appear at a distance of 3.62 inches from the sun, if its orbit were drawn on the same scale, Uranus at a distance of 7.29 inches, and Neptune at a distance of 12.28 inches. The shaded portion indicates the region within which the asteroids, or smaller planets, are found; and the orbit of the largest of these, and those longest known, — Vesta, Ceres, Pallas, and Juno, — are given. The earth has one moon; Mars, two; Jupiter, four; Saturn, eight; Uranus, four; and Neptune, one. Ceres, the first asteroid, was found in 1801, Pallas in 1802, Juno in 1804, and Vesta in 1807. The first asteroids discovered ranged between 300 and 600 kilometres in diameter; while the smaller ones, which have been more recently found, often are not more than from 20 to 50 kilometres in diameter (10 to 25 miles). The distance of the sun from the earth is said to be 92,500,000 miles; and the distance of the nearest fixed star, if given on the same scale as the diagram, would be 78,000 inches (about a mile and a quarter).

"When icicles hang by the wall,
And Dick the shepherd blows his nail,
And Tom bears logs into the hall,
And milk comes frozen home in pail" —
SHAKSPEARE.

JANUARY, 1885.

"Announced by all the trumpets of the sky,
Arrives the snow, and, driving o'er the fields,
Seems nowhere to alight. . . . The housemates sit
Around the radiant fireplace, enclosed
In a tumultuous privacy of storm."
EMERSON.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (Standard Time.) Morn. H. M.	Eve. H. M.
1	1	Th.	♑	☾ 1st. Algenib s. 5.20 A.	7 30	4 39	5 41	7 19	4 49	5 50	7 3	5 6	6 2	7 53	8 35
2	2	Fr.	♑	Venus rises 5.8 M.	7 30	4 40	6 52	7 19	4 50	6 59	7 3	5 7	7 10	8 43	9 21
3	3	Sa.	♑	☌ ☿ ☉ inferior.	7 30	4 41	8 2	7 19	4 51	8 8	7 3	5 7	8 16	9 32	10 14
1.	Sunday after New Year.			Day's Length:	9h. 12m.			9h. 33m.			10h. 5m.				
4	4	Su.	♒	☌ ♃ ☾.	7 30	4 42	9 11	7 19	4 52	9 15	7 3	5 8	9 19	10 21	11 8
5	5	M.	♒	Polaris s. 6.18 A.	7 30	4 43	10 18	7 19	4 53	10 20	7 4	5 9	10 21	11 8	. . .
6	6	Tu.	♒	♁ stationary; ☌ ♁ ☾.	7 30	4 44	11 22	7 19	4 54	11 22	7 4	5 10	11 20	0 2	0 0
7	7	W.	♒	☽ 7th. ☾ in ♌.	7 29	4 45	Morn.	7 19	4 55	Morn.	7 4	5 11	Morn.	0 54	0 53
8	8	Th.	♒	Mars sets 5.25 A.	7 29	4 46	0 23	7 19	4 56	0 21	7 4	5 11	0 17	1 53	1 49
9	9	Fr.	♓	☿ gr. Hel. Lat. N.	7 29	4 47	1 23	7 19	4 57	1 20	7 4	5 12	1 13	2 54	2 51
10	10	Sa.	♓	Achernar s. 6.11 A.	7 29	4 48	2 22	7 19	4 58	2 17	7 4	5 13	2 8	3 54	3 55
2.	1st Sunday after Epiphany.			Day's Length:	9h. 21m.			9h. 41m.			10h. 11m.				
11	11	Su.	♍	Hamel s. 6.34 A.	7 28	4 49	3 18	7 18	4 59	3 12	7 3	5 14	3 1	4 51	4 58
12	12	M.	♍	Jupiter rises 8.23 A.	7 28	4 50	4 11	7 18	5 0	4 4	7 3	5 15	3 51	5 40	5 54
13	13	Tu.	♍	☌ ☿ ☾; ☾ in apogee.	7 28	4 51	5 1	7 18	5 1	4 53	7 3	5 16	4 40	6 24	6 41
14	14	W.	♐	☌ ☿ ☾; ☿ stationary.	7 27	4 53	5 49	7 18	5 2	5 41	7 3	5 17	5 28	7 0	7 22
15	15	Th.	♐	Algol s. 7.18 A.	7 27	4 54	6 34	7 17	5 3	6 26	7 3	5 18	6 14	7 35	7 57
16	16	Fr.	♑	● 16th. ☌ ♂ ☾.	7 26	4 55	Sets.	7 17	5 4	Sets.	7 2	5 19	Sets.	8 4	8 29
17	17	Sa.	♑	Aldebaran s. 8.39 A.	7 26	4 56	6 33	7 16	5 5	6 39	7 2	5 19	6 49	8 31	9 0
3.	2d Sunday after Epiphany.			Day's Length:	9h. 32m.			9h. 50m.			10h. 18m.				
18	18	Su.	♑	Saturn sets 4.31 M.	7 25	4 57	7 33	7 16	5 6	7 38	7 2	5 20	7 44	8 58	9 33
19	19	M.	♒	Capella s. 9.10 A.	7 24	4 59	8 33	7 15	5 8	8 36	7 1	5 21	8 40	9 30	10 7
20	20	Tu.	♒	Rigel s. 9.7 A.	7 24	5 0	9 34	7 15	5 9	9 35	7 1	5 22	9 36	10 5	10 43
21	21	W.	♒	☾ in ♍.	7 23	5 1	10 37	7 14	5 10	10 37	7 1	5 23	10 34	10 42	11 28
22	22	Th.	♓	Canopus s. 10.11 A.	7 22	5 2	11 42	7 14	5 11	11 40	7 0	5 24	11 35	11 24	. . .
23	23	Fr.	♈	☾ 23d. Uranus rises 9.58 A.	7 22	5 4	Morn.	7 13	5 12	Morn.	7 0	5 25	Morn.	0 21	0 16
24	24	Sa.	♈	☌ ☿ ☽; ☌ ♆ ☾.	7 21	5 5	0 48	7 12	5 13	0 40	6 59	5 26	0 36	1 18	1 17
4.	3d Sunday after Epiphany.			Day's Length:	9h. 45m.			10h. 2m.			10h. 28m.				
25	25	Su.	♈	Sirius s. 10.18 A.	7 21	5 6	1 55	7 12	5 14	1 49	6 59	5 27	1 40	2 26	2 30
26	26	M.	♉	☿ gr. elong. W. 24°53′; ☌ ♄ ☾.	7 20	5 7	3 2	7 11	5 15	2 55	6 58	5 28	2 44	3 38	3 51
27	27	Tu.	♉	Neptune sets 1.41 M.	7 18	5 9	4 7	7 10	5 17	3 59	6 58	5 29	3 46	4 49	5 8
28	28	W.	♊	☾ in perigee.	7 17	5 10	5 8	7 10	5 18	5 1	6 57	5 30	4 47	5 51	6 17
29	29	Th.	♊	♆ stationary.	7 16	5 11	6 2	7 9	5 19	5 56	6 57	5 31	5 44	6 47	7 17
30	30	Fr.	♋	○ 30th. ☿ in ♍.	7 15	5 13	Rises.	7 8	5 20	Rises.	6 56	5 32	Rises.	7 39	8 11
31	31	Sa.	♋	☌ ♃ ☾.	7 14	5 14	6 47	7 7	5 21	6 53	6 55	5 33	6 57	8 27	9 2

First Month. ***31 Days.***

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1810. — Charles Ellet, American engineer.
1822. — R. J. E. Clausius, German physicist.
1819. — Piazzi Smyth, Scotch astronomer.

1743. — Sir Joseph Banks, English naturalist.
1643. — Sir Isaac Newton, Eng. mathematician.
1818. — Thomas Hill, American mathematician.
1825. — J. E. Hilgard, American geodesist.
1833. — Sir Henry Roscoe, English chemist.

1808. — Wilhelm Schimper, German botanist.

1825. — William Spottiswoode, Eng. physicist.
1825. — Bayard Taylor, American traveller.
1716. — Don Antonio de Ulloa, Span. physicist.
1801. — Adolphe T. Brongniart, French botanist.
1806. — M. F. Maury, American hydrographer.
1780. — Parker Cleaveland, Amer. mineralogist.
1706. — Benjamin Franklin, Amer. philosopher.
1761. — J. Hall, Scotch geologist.
1781. — Robert Hare, American chemist.

1825. — E. Frankland, English chemist.
1736. — James Watt, Scotch mechan. engineer.
1775. — A. M. Ampère, French physicist.
1813. — John C. Fremont, Am. eng. and explorer.
1798. — Charles Davies, Amer. mathematician.
1796. — F. J. Hugi, Swiss alpinist.

1627. — Robert Boyle, Irish physicist.
1736. — J. L. Lagrange, French mathematician.
1799. — S. G. Morton, American ethnologist.

1608. — G. A. Borelli, Italian mathematician.
1688. — Emanuel Swedenborg, Swedish philos.
1700. — Daniel Bernouilli, Swiss mathematician.

MOON'S PHASES. (*Standard Time.*)

	Eastern. d. h. m.	Central. d. h. m.	Mountain. d. h. m.	Pacific. d. h. m.
Full Moon	1 0 26 M.	.. .. ..	.. .. ..	.. .. ..
Last Quarter	7 10 36 A.	7 9 36 A.	7 8 36 A.	7 7 36 A.
New Moon	16 3 36 M.	16 2 36 M.	16 1 36 M.	16 0 36 M.
First Quarter	23 8 26 A.	23 7 26 A.	23 6 26 A.	23 5 26 A.
Full Moon	30 11 19 M.	30 10 19 M.	30 9 19 M.	30 8 19 M.

A BRIEF GUIDE TO THE DECADE.

Jan. 1, 1880, fell on Thursday.
" 1881, " " Saturday.
" 1882, " " Sunday.
" 1883, " " Monday.
" 1884, " " Tuesday.

Jan. 1, 1886, will fall on Friday.
" 1887, " " " Saturday.
" 1888, " " " Sunday.
" 1889, " " " Tuesday.
" 1890, " " " Wednesday.

"The wintry west extends his blast,
And hail and rain does blaw;
Or the storm north sends driving forth
The blinding sleet and snaw."

BURNS.

FEBRUARY, 1885.

"And once I learned how marvellous winter was,
When past the fence-rails, downy-gray with rime,
I creaked adventurous o'er the spangled crust
That made familiar fields seem far and strange."

LOWELL.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston: Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington: Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C.: Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (Standard Time.) Morn. H. M.	Eve. H. M.
5. Septuagesima Sun lay.				Day's Length:	10h. 2m.			10h. 16m.			10h. 39m.				
32	1	Su.	♌	☿ in ♉.	7 13	5 15	7 57	7 6	5 22	8 0	6 55	5 34	8 2	9 12	9 49
33	2	M.	♌	☽ ☌ ☾.	7 12	5 17	9 4	7 5	5 24	9 5	6 54	5 35	9 5	9 56	10 37
34	3	Tu.	♍	Venus rises 5.59 M.	7 11	5 18	10 8	7 4	5 25	10 7	6 54	5 36	10 4	10 44	11 21
35	4	W.	♍	♂ gr. Hel. Lat. S.; ☾ in ♌.	7 10	5 19	11 10	7 3	5 26	11 7	6 53	5 36	11 2	11 28	. . .
36	5	Th.	♎	Algol s. 5.56 A.	7 9	5 20	Morn.	7 2	5 27	Morn.	6 52	5 37	11 58	0 11	0 14
37	6	Fr.	♎	☽ 6th. Aldebaran s. 7.20 A.	7 8	5 22	0 10	7 1	5 28	0 6	6 51	5 38	Morn.	1 5	1 6
38	7	Sa.	♎	Capella s. 7.55 A.	7 7	5 23	1 7	7 0	5 29	1 1	6 50	5 39	0 52	2 4	2 7
6. Sexagesima Sunday.				Day's Length:	10h. 19m.			10h. 31m.			10h. 51m.				
39	8	Su.	♏	□ ♆ ☉.	7 5	5 24	2 2	6 59	5 30	1 56	6 49	5 40	1 44	3 8	3 16
40	9	M.	♏	☾ in apogee.	7 4	5 26	2 55	6 58	5 32	2 48	6 49	5 41	2 34	4 9	4 23
41	10	Tu.	♐	Mars sets 5.26 A.	7 3	5 27	3 44	6 57	5 33	3 36	6 48	5 42	3 23	5 3	5 22
42	11	W.	♐	☌ ♂ ☉; ☌ ☿ ♀.	7 1	5 28	4 29	6 56	5 34	4 22	6 47	5 43	4 9	5 49	6 9
43	12	Th.	♐	☿ in aphelion.	7 0	5 30	5 11	6 55	5 35	5 5	6 46	5 44	4 53	6 29	6 49
44	13	Fr.	♑	☌ ♀ ☾; ☌ ☿ ☾.	6 58	5 31	5 50	6 53	5 36	5 45	6 45	5 45	5 35	7 4	7 26
45	14	Sa.	♑	● 14th. ☌ ♂ ☾.	6 57	5 32	Sets.	6 52	5 38	Sets.	6 44	5 45	Sets.	7 34	7 59
7. Quinquagesima (Shrove Sunday).				Day's Length:	10h. 37m.			10h. 47m.			11h. 3m.				
46	15	Su.	♒	Jupiter rises 5.51 A.	6 56	5 33	6 25	6 51	5 38	6 29	6 43	5 46	6 33	8 4	8 34
47	16	M.	♒	♄ stationary.	6 55	5 35	7 27	6 50	5 39	7 29	6 42	5 47	7 31	8 38	9 5
48	17	Tu.	♓	☾ in ♉.	6 53	5 36	8 30	6 48	5 41	8 30	6 41	5 48	8 29	9 10	9 39
49	18	W.	♓	☿ ☌ ☉.	6 52	5 37	9 34	6 47	5 42	9 32	6 40	5 49	9 28	9 45	10 18
50	19	Th.	♓	Rigel s. 7.9 A.	6 50	5 38	10 40	6 46	5 43	10 37	6 39	5 50	10 30	10 24	11 4
51	20	Fr.	♈	☽ ♆ ☾.	6 49	5 40	11 46	6 44	5 44	11 41	6 38	5 51	11 32	11 9	11 55
52	21	Sa.	♈	☾ 22d. Saturn sets 2.15 M.	6 47	5 41	Morn.	6 43	5 45	Morn.	6 37	5 51	Morn.	. . .	0 2
8. First Sunday in Lent.				Day's Length:	10h. 56m.			11h. 4m.			11h. 16m.				
53	22	Su.	♉	☽ ♄ ☾.	6 46	5 42	0 52	6 42	5 46	0 46	6 36	5 52	0 35	0 55	1 8
54	23	M.	♉	Uranus rises 7.52 A.	6 44	5 43	1 56	6 40	5 47	1 49	6 34	5 53	1 36	2 7	2 29
55	24	Tu.	♊	Canopus s. 8.1 A.	6 43	5 45	2 56	6 39	5 48	2 48	6 33	5 54	2 35	3 24	3 54
56	25	W.	♊	☾ in perigee.	6 41	5 46	3 51	6 38	5 49	3 44	6 32	5 55	3 31	4 36	5 8
57	26	Th.	♊	Neptune sets 11.41 A.	6 40	5 47	4 41	6 36	5 50	4 35	6 31	5 56	4 24	5 38	6 12
58	27	Fr.	♋	☽ ♃ ☾.	6 38	5 48	5 25	6 35	5 51	5 21	6 30	5 56	5 12	6 33	7 4
59	28	Sa.	♌	○ 28th. ☿ in perihelion.	6 36	5 50	Rises.	6 33	5 52	Rises.	6 29	5 57	Rises.	7 22	7 53

Second Month. 28 Days.

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1813. — James D. Dana, American naturalist.
1825. — John C. Dalton, American physiologist.
1820. — Elisha K. Kane, Am. Arctic explorer.
1790. — John Bachman, American naturalist.
1770. — Alexandre Brongniart, French geologist.
1825. — Joseph Winlock, American astronomer.

1739. — William Bartram, American traveller.
1827. — William D. Whitney, Amer. philologist.
1796. — T. de la Beche, English geologist.
1847. — Thomas A. Edison, American electrician.
1809. — Charles Darwin, English naturalist.
1672. — Étienne Geoffroy, French physicist.
1728. — J. Hunter, English physiologist.
1823. — Johanne R. Wagner, German chemist.

1801. — J. T. C. Ratzeburg, German naturalist.
1740. — H. B. de Saussure, Swiss physicist.
1564. — Galileo Galilei, Italian astronomer.
1473. — N. Copernicus, German astronomer.
1745. — Alessandro Volta, Italian physicist.
1822. — Wolcott Gibbs, American chemist.

1784. — Major John E. LeConte, Am. zoölogist.
1796. — L. A. J. Quetelet, Belgian astronomer.
1804. — C. Bremiker, German mathematician.
1801. — James Deane, American geologist.
1728. — A. Baumé, French chemist.
1786. — D. F. J. Arago, French astronomer.
1823. — Joseph LeConte, American geologist.
1743. — R. J. Haüy, French mineralogist.

MOON'S PHASES. (*Standard Time.*)

	Eastern. d. h. m.	Central. d. h. m.	Mountain. d. h. m.	Pacific. d. h. m.
Last Quarter	6 5 37 A.	6 4 37 A.	6 3 37 A.	6 2 37 A.
New Moon	14 9 22 A.	14 8 22 A.	14 7 22 A.	14 6 22 A.
First Quarter	22 5 31 M.	22 4 31 M.	22 3 31 M.	22 2 31 M.
Full Moon	28 11 0 A.	28 10 0 A.	28 9 0 A.	28 8 0 A.

A BRIEF GUIDE TO THE DECADE.

Feb. 1, 1880, fell on Sunday.
" 1881, " " Tuesday.
" 1882, " " Wednesday.
" 1883, " " Thursday.
" 1884, " " Friday.
Feb. 1, 1886, will fall on Monday.
" 1887, " " " Tuesday.
" 1888, " " " Wednesday.
" 1889, " " " Friday.
" 1890, " " " Saturday.

"HAM. — The air bites shrewdly; it is very cold.
HOR. — It is a nipping and an eager air."
SHAKSPEARE.

MARCH, 1885.

"*And it is pleasant, when the noisy streams*
Are just set free, and milder suns melt off
The plashy snow, save only the firm drift
In the deep glen or the close shade of pines." BRYANT.

Mean time is used unless otherwise specified.

Third Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	LATITUDE OF BOSTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF WASHINGTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF CHARLESTON, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	HIGH WATER, NEW YORK. (*Standard Time.*) Morn. H. M.	Eve. H. M.	BIRTHDAYS OF SCIENTIFIC CELEBRITIES.
9.	2d Sunday in Lent.			Day's Length:	11h. 16m.			11h. 21m.			11h. 30m.					
60	1	Su.	☊	Canopus s. 7.41 A.	6 35	5 51	6 42	6 32	5 53	6 44	6 28	5 58	6 45	8 7	8 38	
61	2	M.	♍	☿ ☍ ☾.	6 33	5 52	7 48	6 30	5 54	7 48	6 26	5 59	7 46	8 53	9 19	1811. — Hugh E. Strickland, Eng. naturalist.
62	3	Tu.	♍	☾ in ☊.	6 32	5 53	8 52	6 29	5 56	8 50	6 25	5 59	8 46	9 34	10 0	1847. — Alexander Graham Bell, Am. electrician.
63	4	W.	♍	☿ gr. Hel. Lat. S.	6 30	5 54	9 55	6 28	5 57	9 51	6 24	6 0	9 45	10 14	10 43	1792. — Isaac Lea, American naturalist.
64	5	Th.	♎	Venus rises 5.56 M.	6 28	5 56	10 55	6 26	5 58	10 50	6 23	6 1	10 41	10 55	11 27	1512. — G. Mercator, French geographer.
65	6	Fr.	♎	☿ in aphelion.	6 27	5 57	11 52	6 25	5 59	11 46	6 21	6 2	11 35	11 38	...	1787. — J. Fraunhofer, German physicist.
66	7	Sa.	♍	☌ ☿ ☌; □ ♄ ☉.	6 25	5 58	Morn.	6 23	6 0	Morn.	6 20	6 3	Morn.	0 14	0 27	1746. — André Michaux, American botanist. 1792. — Sir William Herschel, Eng. astronomer. 1837. — Henry Draper, American astronomer.
10.	3d Sunday in Lent.			Day's Length:	11h. 36m.			11h. 39m.			11h. 45m.					
67	8	Su.	♍	☽ 8th. Sirius s. 7.33 A.	6 23	5 59	0 46	6 22	6 1	0 39	6 19	6 4	0 26	1 9	1 25	
68	9	M.	♍	☾ in apogee. ♒.	6 21	6 0	1 37	6 20	6 2	1 29	6 18	6 4	1 16	2 8	2 33	1451. — Amerigo Vespucci, Italian explorer.
69	10	Tu.	♐	Mars rises 6.13 M.	6 20	6 1	2 24	6 19	6 3	2 16	6 16	6 5	2 3	3 11	3 43	1628. — M. Malpighi, Italian naturalist.
70	11	W.	♐	Castor s. 8.8 A.	6 18	6 3	3 7	6 17	6 4	3 0	6 15	6 6	2 47	4 9	4 41	1811. — U. J. J. LeVerrier, French astronomer.
71	12	Th.	♑	Procyon s. 8.10 A.	6 16	6 4	3 46	6 15	6 5	3 40	6 14	6 6	3 29	4 59	5 29	1835. — Simon Newcomb, Amer. mathematician.
72	13	Fr.	♑	☿ ☿ ☉ superior.	6 15	6 5	4 22	6 14	6 6	4 17	6 12	6 7	4 9	5 44	6 12	1733. — J. Priestley, English chemist.
73	14	Sa.	♒	Jupiter sets 5.18 M.	6 13	6 6	4 56	6 12	6 7	4 53	6 11	6 8	4 46	6 22	6 51	1819. — E. Edlund, Swedish physicist.
11.	4th Sunday in Lent.			Day's Length:	11h. 56m.			11h. 57m.			11h. 59m.					
74	15	Su.	♒	☿ ♀ ☾; ☿ ♂ ☾.	6 11	6 7	5 29	6 11	6 8	5 27	6 10	6 9	5 23	7 2	7 28	1776. — Gerald Troost, American geologist.
75	16	M.	♒	● 16th. ☿ ♀ ☾.	6 9	6 8	Sets.	6 9	6 9	Sets.	6 8	6 9	Sets.	7 38	8 2	1801. — George P. Marsh, American philologist.
76	17	Tu.	♓	☾ in ♉.	6 8	6 10	7 24	6 8	6 10	7 23	6 7	6 10	7 20	8 14	8 36	1750. — Caroline L. Herschel, Eng. astronomer.
77	18	W.	♓	Saturn sets 0.41 M.	6 6	6 11	8 30	6 6	6 11	8 27	6 6	6 11	8 22	8 51	9 16	1787. — G. S. Ohm, German physicist.
78	19	Th.	♈	Denebola s. 11.52 A.	6 4	6 12	9 38	6 5	6 12	9 34	6 5	6 11	9 25	9 30	9 59	1800. — F. Lieber, Am. publicist and geologist.
79	20	Fr.	♈	☉ enters ♈, spring begins; ☿ ♅ ☾.	6 3	6 13	10 45	6 3	6 13	10 39	6 3	6 12	10 28	10 14	10 46	1782. — W. Biela, Austrian astronomer.
80	21	Sa.	♉	♂ ☍ ☉.	6 1	6 14	11 50	6 2	6 14	11 43	6 2	6 13	11 30	11 5	11 39	1834. — C. W. Eliot, Am. chemist and educator. 1768. — J. B. J. Fourier, French physicist.
12.	5th Sunday in Lent.			Day's Length:	12h. 16m.			12h. 15m.			12h. 12m.					
81	22	Su.	♉	☿ ♄ ☾.	5 59	6 15	Morn.	6 0	6 15	Morn.	6 1	6 13	Morn.	...	0 4	
82	23	M.	□	☾ 23d. ☿ in ☊; ☾ in perigee. ♓.	5 57	6 16	0 51	5 58	6 15	0 43	5 59	6 14	0 30	0 43	1 18	1799. — F. W. Argelander, German astronomer.
83	24	Tu.	□	Uranus sets 5.56 M.	5 56	6 17	1 47	5 57	6 16	1 40	5 58	6 15	1 27	1 54	2 43	1769. — William Smith, English geologist.
84	25	W.	♋	Pollux s. 7.24 A.	5 54	6 18	2 37	5 55	6 17	2 31	5 57	6 16	2 20	3 11	4 2	1834. — J. W. Powell, Am. geol. and ethnologist.
85	26	Th.	♋	Regulus s. 9.43 A.	5 52	6 20	3 21	5 53	6 18	3 16	5 55	6 16	3 7	4 22	5 7	1516. — C. Gesner, German naturalist.
86	27	Fr.	♋	☿ ♃ ☾; ☿ ♂ ♀.	5 50	6 21	4 1	5 52	6 19	3 58	5 54	6 17	3 51	5 23	6 1	1753. — Count Rumford, American physicist.
87	28	Sa.	♌	☿ in perihelion; ♀ gr. Hel. Lat. S.	5 49	6 22	4 37	5 50	6 20	4 35	5 53	6 18	4 31	6 15	6 47	1773. — Nathaniel Bowditch, Am. mathematic'n. 1749. — P. S. LaPlace, French mathematician. 1793. — Henry R. Schoolcraft, Am. ethnologist.
13.	Palm Sunday.			Day's Length:	12h. 36m.			12h. 32m.			12h. 27m.					
88	29	Su.	☊	☿ ☍ ☾.	5 47	6 23	5 12	5 49	6 21	5 12	5 51	6 18	5 11	7 6	7 30	
89	30	M.	♍	○ 30th. ☾ in ☊.	5 45	6 24	Rises.	5 47	6 22	Rises.	5 50	6 19	Rises.	7 48	8 12	
90	31	Tu.	♍	Neptune sets 9.36 A.	5 43	6 25	7 39	5 46	6 23	7 36	5 49	6 20	7 31	8 29	8 51	1596. — Réné D. Descartes, French philosopher.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
LAST QUARTER	8 1 54 A.	8 0 54 A.	8 11 54 M.	8 10 54 M.
NEW MOON	16 0 37 A.	16 11 37 M.	16 10 37 M.	16 9 37 M.
FIRST QUARTER	23 0 23 A.	23 11 23 M.	23 10 23 M.	23 9 23 M.
FULL MOON	30 11 40 M.	30 10 40 M.	30 9 40 M.	30 8 40 M.

A BRIEF GUIDE TO THE DECADE.

Mar. 1, 1880,	fell on	Monday.	Mar. 1, 1886,	will fall on	Monday.
" 1881,	" "	Tuesday.	" 1887,	" "	Tuesday.
" 1882,	" "	Wednesday.	" 1888,	" "	Thursday.
" 1883,	" "	Thursday.	" 1889,	" "	Friday.
" 1884,	" "	Saturday.	" 1890,	" "	Saturday.

"And every plaine was pclothed faire
With newe greene, and maketh smale floures
To springen here and there in fielde and mede:
So very good and wholesome be the shoures."
CHAUCER.

APRIL, 1885.

"*Lodged in sunny cleft,*
Where the cold breezes come not, blooms alone
The little wind-flower, whose just opened eye
Is blue as the spring heaven it gazes at,
Startling the loiterer in the naked groves
With unexpected beauty." BRYANT.

Mean time is used unless otherwise specified.

Fourth Month. 30 Days.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	LATITUDE OF BOSTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF WASHINGTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF CHARLESTON, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	HIGH WATER, NEW YORK. (*Standard Time.*) Morn. H. M.	Eve. H. M.	BIRTHDAYS OF SCIENTIFIC CELEBRITIES.
91	1	W.	♎	Regulus s. 9.20 A.	5 42	6 26	8 40	5 44	6 24	8 36	5 47	6 20	8 28	9 8	9 29	1744. — J. B. Lamarck, French zoölogist.
92	2	Th.	♎	Venus rises 5.33 M.	5 40	6 28	9 39	5 43	6 25	9 33	5 46	6 21	9 23	9 47	10 7	1764. — E. F. Schlotheim, Ger. paleontologist.
93	3	Fr.	♏	Pollux s. 6.48 A.	5 38	6 29	10 35	5 41	6 26	10 28	5 45	6 22	10 16	10 26	10 45	1793. — Dionysius Lardner, Irish physicist.
94	4	Sa.	♏	Denebola s. 10.49 A.	5 36	6 30	11 28	5 39	6 27	11 20	5 44	6 23	11 7	11 7	11 26	1809. — Benjamin Peirce, Amer. mathematician.
																1823. — Sir William Siemens, Eng. physicist.
14.	Easter Sunday.			Day's Length:	12h. 56m.			12h. 50m.			12h. 41m.					
95	5	Su.	♏	Spica s. 0.24 M. ☋.	5 35	6 31	Morn.	5 38	6 28	Morn.	5 42	6 23	11 56	11 53	...	1768. — Diedrich Karsten, Ger. mineralogist.
96	6	M.	♐	☾ in apogee.	5 33	6 32	0 17	5 36	6 29	0 9	5 41	6 24	Morn.	0 12	0 47	
97	7	Tu.	♐	☽ 7th. ☿ gr. Hel. Lat. N.	5 31	6 33	1 1	5 35	6 30	0 54	5 40	6 25	0 41	1 3	1 49	1727. — M. Adanson, French naturalist.
98	8	W.	♑	☿ gr. elong. E. 19°26′.	5 30	6 34	1 41	5 33	6 31	1 35	5 38	6 25	1 23	1 58	2 53	1732. — David Rittenhouse, Amer. astronomer.
99	9	Th.	♑	Mars rises 5.10 M.	5 28	6 35	2 19	5 32	6 32	2 14	5 37	6 26	2 4	2 59	3 53	1814. — C. J. Malmsten, Swedish mathematician.
100	10	Fr.	♑	Arcturus s. 0.56 M.	5 26	6 36	2 54	5 30	6 33	2 50	5 36	6 27	2 43	3 55	4 40	
101	11	Sa.	♒	Alphacca s. 2.11 M.	5 25	6 38	3 27	5 29	6 34	3 25	5 35	6 28	3 20	4 53	5 24	1804. — O. L. Erdmann, German chemist.
15.	Low Sunday.			Day's Length:	13h. 16m.			13h. 8m.			12h. 55m.					
102	12	Su.	♒	Jupiter sets 3.19 M.	5 23	6 39	3 59	5 27	6 35	3 58	5 33	6 28	3 56	5 48	6 7	1773. — Thomas Thomson, English chemist.
103	13	M.	♓	☌ ♂ ☾; ☾ in ♉.	5 21	6 40	4 31	5 26	6 36	4 32	5 32	6 29	4 32	6 22	6 49	1743. — Thos. Jefferson, Am. statesman and nat.
104	14	Tu.	♓	● 14th. ☌ ☿ ☾.	5 20	6 41	5 5	5 24	6 37	5 8	5 31	6 30	5 11	7 5	7 31	1629. — C. Huyghens, Dutch physicist.
105	15	W.	♈	15th. ☌ ☿ ☾.	5 18	6 42	Sets.	5 23	6 38	Sets.	5 30	6 30	Sets.	7 48	8 14	1772. — E. G. Saint-Hilaire, French zoölogist.
106	16	Th.	♈	☌ ♅ ☾.	5 17	6 43	8 31	5 21	6 38	8 26	5 29	6 31	8 16	8 33	8 58	1800. — James C. Ross, Brit. Arctic navigator.
107	17	Fr.	♉	☿ stationary.	5 15	6 44	9 40	5 20	6 39	9 33	5 27	6 32	9 21	9 20	9 44	1794. — K. F. P. Martius, German botanist.
108	18	Sa.	♉	☌ ♄ ☾; ☾ in perigee.	5 14	6 45	10 45	5 19	6 40	10 37	5 26	6 32	10 24	10 12	10 34	1822. — A. Petermann, German geographer.
16.	2d Sunday after Easter.			Day's Length:	13h. 34m.			13h. 24m.			13h. 8m.					
109	19	Su.	□	Saturn sets 10.43 A. ♑.	5 12	6 46	11 43	5 17	6 41	11 35	5 25	6 33	11 22	11 9	11 30	1795. — C. G. Ehrenberg, German naturalist.
110	20	M.	□	Antares s. 2.28 M.	5 10	6 48	Morn.	5 16	6 42	Morn.	5 24	6 34	Morn.	...	0 15	1824. — Jules Marcou, Swiss and Am. geologist.
111	21	Tu.	□	☾ 21st. ♃ stationary.	5 9	6 49	0 35	5 14	6 43	0 28	5 23	6 35	0 16	0 32	1 29	1807. — L. Palmieri, Italian physicist.
112	22	W.	♋	Vega s. 4.31 M.	5 7	6 50	1 22	5 13	6 44	1 17	5 22	6 35	1 6	1 41	2 46	1724. — Immanuel Kant, German philosopher.
113	23	Th.	♋	☌ ♃ ☾.	5 6	6 51	2 2	5 12	6 45	1 58	5 21	6 36	1 50	2 52	3 55	1798. — Sir W. E. Logan, Canadian geologist.
114	24	Fr	♌	Uranus sets 3.52 M.	5 4	6 52	2 38	5 10	6 46	2 36	5 20	6 37	2 31	3 59	4 52	
115	25	Sa.	♌	☌ ♇ ☾.	5 3	6 53	3 12	5 9	6 47	3 12	5 19	6 37	3 9	5 4	5 43	1819. — Otto W. Struve, Russian astronomer.
17.	3d Sunday after Easter.			Day's Length:	13h. 53m.			13h. 40m.			13h. 21m.					
116	26	Su.	♍	☾ in ♌.	5 1	6 54	3 45	5 8	6 48	3 46	5 17	6 38	3 47	5 56	6 29	1774. — C. L. von Buch, German geologist.
117	27	M.	♍	☌ ☿ ☉ inferior.	5 0	6 55	4 17	5 7	6 49	4 20	5 16	6 39	4 23	6 44	7 10	1791. — S. F. B. Morse, American electrician.
118	28	Tu.	♎	28th. ☌ ☿ ♀.	4 59	6 56	4 48	5 5	6 50	4 53	5 15	6 40	4 59	7 26	7 48	1782. — William Darlington, American botanist.
119	29	W.	♎	○ 29th. Neptune sets 7.46 A.	4 57	6 58	Rises.	5 4	6 51	Rises.	5 14	6 41	Rises.	8 8	8 28	1811. — J. W. Bailey, American microscopist.
120	30	Th.	♎	☿ in ♉.	4 56	6 59	8 24	5 3	6 52	8 18	5 13	6 41	8 6	8 47	9 3	1834. — Sir J. Lubbock, English naturalist.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
LAST QUARTER	7 9 42 M.	7 8 42 M.	7 7 42 M.	7 6 42 M.
NEW MOON	15 0 52 M.	14 11 52 A.	14 10 52 A.	14 9 52 A.
FIRST QUARTER	21 6 20 A.	21 5 20 A.	21 4 20 A.	21 3 20 A.
FULL MOON	29 1 14 M.	29 0 14 M.	28 11 14 A.	28 10 14 A.

A BRIEF GUIDE TO THE DECADE.

April 1, 1880, fell on Thursday.	April 1, 1886, will fall on Thursday.
" 1881, " " Friday.	" 1887, " " " Friday.
" 1882, " " Saturday.	" 1888, " " " Sunday.
" 1883, " " Sunday.	" 1889, " " " Monday.
" 1884, " " Tuesday.	" 1890, " " " Tuesday.

"A violet by a mossy stone
Half hidden from the eye!
Fair as a star, when only one
Is shining in the sky."

WORDSWORTH.

MAY, 1885.

"*For half our May's so awfully like mayn't,*
'Twould rile a Shaker or an evrige saint;
Though I own up I like our back'ard springs
That kind o' haggle with their gr'ens an' things,
An' when you most give up 'ithout more words
Toss the fields full o' blossoms, leaves, an' birds." LOWELL.

Mean time is used unless otherwise specified.

Fifth Month. 31 Days.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (Standard Time.) Morn. H. M.	Eve. H. M.
121	1	Fr.	♏	Regulus s. 7.22 A.	4 54	7 0	9 19	5 2	6 53	9 12	5 12	6 42	8 59	9 23	9 37
122	2	Sa.	♏	Venus rises 5.6 M.	4 53	7 1	10 10	5 0	6 54	10 2	5 11	6 43	9 49	10 1	10 10
18.	4th Sunday after Easter.			Day's Length:	14h. 10m.			13h. 56m.			13h. 33m.				
123	3	Su.	♐	Denebola s. 8.55 A. ♃.	4 58	7 2	10 57	4 59	6 55	10 49	5 10	6 43	10 36	10 39	10 44
124	4	M.	♐	☌ ☿ ☉ superior; ☾ in apogee.	4 50	7 3	11 40	4 58	6 56	11 33	5 9	6 44	11 21	11 22	11 23
125	5	Tu.	♐	Spica s. 10.23 A.	4 49	7 4	Morn.	4 57	6 57	Morn.	5 9	6 45	Morn.	. . .	0 8
126	6	W.	♑	Mars rises 4.15 M.	4 48	7 5	0 18	4 56	6 57	0 12	5 8	6 45	0 2	0 5	1 3
127	7	Th.	♑	☽ 7th. Arcturus s. 11.6 A	4 47	7 6	0 53	4 55	6 58	0 49	5 7	6 46	0 40	0 56	1 57
128	8	Fr.	♒	Alphacca s. 0.25 M.	4 46	7 8	1 26	4 54	6 59	1 23	5 6	6 47	1 17	1 55	2 51
129	9	Sa.	♒	Jupiter sets 1.33 M.	4 44	7 9	1 57	4 53	7 0	1 56	5 5	6 47	1 52	2 54	3 47
19.	Rogation Sunday.			Day's Length:	14h. 27m.			14h. 9m.			13h. 44m.				
130	10	Su.	♒	☿ in aphelion; ☾ in ♉.	4 43	7 10	2 28	4 52	7 1	2 28	5 4	6 48	2 27	3 51	4 40
131	11	M.	♓	☿ stationary; ☌ ♆ ☿.	4 42	7 11	3 1	4 51	7 2	3 3	5 3	6 49	3 5	4 47	5 26
132	12	Tu.	♓	☌ ♂ ☾; ☌ ☿ ☾.	4 41	7 12	3 35	4 50	7 3	3 39	5 3	6 50	3 43	5 41	6 19
133	13	W.	♈	☌ ☿ ♂; ☌ ♆ ☉.	4 40	7 13	4 12	4 49	7 4	4 18	5 2	6 51	4 26	6 35	7 8
134	14	Th.	♈	● 14th. ☌ ♆ ☾; ☌ ☿ ☾.	4 39	7 14	Sets.	4 48	7 5	Sets.	5 1	6 51	Sets.	7 28	7 56
135	15	Fr.	♉	Saturn sets 9.13 A.	4 38	7 15	8 30	4 47	7 6	8 23	5 1	6 52	8 10	8 19	8 44
136	16	Sa.	♉	☌ ♄ ☾; ☾ in perigee. ♎.	4 37	7 16	9 33	4 46	7 7	9 25	5 0	6 53	9 12	9 14	9 34
20.	Sunday after Ascension.			Day's Length:	14h. 41m.			14h. 23m.			13h. 54m.				
137	17	Su.	♋	☐ ♅ ☉.	4 36	7 17	10 30	4 45	7 8	10 23	4 59	6 53	10 10	10 10	10 24
138	18	M.	♋	Antares s. 0.38 M.	4 35	7 18	11 20	4 44	7 8	11 14	4 59	6 54	11 3	11 10	11 19
139	19	Tu.	♋	Vega s. 2 44 M.	4 34	7 19	Morn.	4 44	7 9	11 59	4 58	6 55	11 50	. . .	0 15
140	20	W.	♋	☾ 20th. ☌ ♅ ☾.	4 33	7 20	0 3	4 43	7 10	Morn.	4 57	6 56	Morn.	0 17	1 24
141	21	Th.	♌	☾ 21st. Uranus sets 2.5 M.	4 32	7 21	0 41	4 42	7 11	0 38	4 57	6 56	0 32	1 19	2 30
142	22	Fr.	♌	☌ ♁ ☾.	4 32	7 22	1 16	4 41	7 12	1 15	4 56	6 57	1 12	2 29	3 33
143	23	Sa.	♍	☿ in ♌.	4 31	7 23	1 49	4 41	7 13	1 50	4 56	6 58	1 49	3 36	4 30
21.	Pentecost (Whit Sunday).			Day's Length:	14h. 54m.			14h. 33m.			14h. 3m.				
144	24	Su.	♍	☾ in ♌.	4 30	7 24	2 20	4 40	7 13	2 23	4 55	6 58	2 25	4 37	5 24
145	25	M.	♍	☿ gr. elong. W. 24°59′.	4 29	7 25	2 51	4 39	7 14	2 55	4 55	6 59	3 0	5 31	6 11
146	26	Tu.	♎	Altair s. 3.29 M.	4 28	7 26	3 23	4 39	7 15	3 29	4 55	6 59	3 37	6 22	6 54
147	27	W.	♎	Spica s. 8 56 A.	4 28	7 26	3 59	4 38	7 16	4 6	4 54	7 0	4 17	7 8	7 34
148	28	Th.	♏	☽ 28th. Neptune rises 4.5 M.	4 27	7 27	Rises.	4 38	7 17	Rises.	4 54	7 1	Rises.	7 51	8 9
149	29	Fr.	♏	☌ ♅ *Regulus.*	4 27	7 28	8 5	4 37	7 17	7 58	4 53	7 1	7 44	8 30	8 43
150	30	Sa.	♐	☌ ☿ ♂. ♃.	4 26	7 29	8 53	4 37	7 18	8 45	4 53	7 2	8 32	9 7	9 12
22.	Trinity Sunday.			Day's Length:	15h. 4m.			14h. 43m.			14h. 9m.				
151	31	Su.	♐	☿ gr. Hel. Lat. S.; ☾ in apogee.	4 26	7 30	9 38	4 36	7 19	9 31	4 53	7 2	9 18	9 42	9 40

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1797. — H. K. W. Berghaus, Ger. geographer.
1809. — L. G. de Koninck, Belg. paleontologist.
1825. — Thomas H. Huxley, English naturalist.
1811. — J. W. Draper, American physicist.
1832. — Isaac I. Hayes, American explorer.
1833. — F. P. W. Richthofen, German geologist.
1785. — James P. Espy. Amer. meteorologist.
1773. — William Phillips, English geologist.
1788. — A. J. Fresnel, French physicist.
1722. — Peter Camper. Dutch physiologist.
1803. — J. J. Liebig, German chemist.
1825. — Joseph Leidy, American biologist.
1686. — G. D. Fahrenheit, German physicist.
1780. — J. J. Audubon, American ornithologist.
1799. — Ebenezer Emmons, American geologist.
1741. — Faujas de Saint-Fond, French geologist.
1778. — Andrew Ure, Scotch chemist.
1815. — Gen. J. C. Barnard, American engineer.
1819. — Sir Lyon Playfair, English chemist.
1790. — J. Dumont d'Urville, French navigator.
1707. — Carl von Linné, Swedish naturalist.
1793. — Edward Hitchcock, Amer. geologist.
1794. — William Whewell, English physicist.
1803. — Prince C. L. Bonaparte, Fr. ornithol.
1820. — W. Chauvenet, Amer. mathematician.
1807. — Louis Agassiz, Swiss and Am. naturalist.
1716. — L. Daubenton, French mineralogist.
1797. — K. F. Naumann, Ger. mineralogist.
1817. — H. A. Hagen, Ger. and Am. entomol.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
Last Quarter	7 3 43 M.	7 2 43 M.	7 1 43 M.	7 0 43 M.
New Moon	14 10 17 M.	14 9 17 M.	14 8 17 M.	14 7 17 M.
First Quarter	21 0 45 M.	20 11 45 A.	20 10 45 A.	20 9 45 A.
Full Moon	28 3 31 A.	28 2 31 A.	28 1 31 A.	28 0 31 A.

A BRIEF GUIDE TO THE DECADE.

May 1, 1880, fell on Saturday.
" 1881, " " Sunday.
" 1882, " " Monday.
" 1883, " " Tuesday.
" 1884, " " Thursday.
May 1, 1886, will fall on Saturday.
" 1887, " " " Sunday.
" 1888, " " " Tuesday.
" 1889, " " " Wednesday.
" 1890, " " " Thursday.

"'Tis heaven alone is given away,
'Tis only God may be had for the asking,
No price is set on the lavish summer,
June may be had by the poorest comer."
LOWELL.

JUNE, 1885.

"*The oriole should build and tell*
His love-tale close beside my cell;
The idle butterfly
Should rest him there, and there be heard
The housewife bee and humming-bird." BRYANT.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (*Standard Time.*) Morn. H. M.	Eve. H. M.
152	1	M.	♐	Spica s. 8.36 A.	4 25	7 30	10 18	4 36	7 19	10 12	4 52	7 3	10 1	10 16	10 9
153	2	Tu.	♑	Venus sets 7.54 A.	4 25	7 31	10 53	4 36	7 20	10 48	4 52	7 3	10 39	10 52	10 43
154	3	W.	♑	Arcturus s. 9.20 A.	4 24	7 32	11 26	4 35	7 21	11 22	4 52	7 4	11 15	11 33	11 24
155	4	Th	♒	Alphacca s. 10.35 A.	4 24	7 32	11 58	4 35	7 21	11 56	4 52	7 5	11 51	...	0 14
156	5	Fr.	♒	☽ 5th. ♁ stationary; ☌ ☿.	4 24	7 33	Morn.	4 35	7 22	Morn.	4 52	7 5	Morn.	0 8	1 4
157	6	Sa.	♒	☾ in ♉.	4 23	7 34	0 29	4 34	7 23	0 28	4 51	7 5	0 26	0 58	2 2
23.	1st Sunday after Trinity.			Day's Length:	15h. 11m.			14h. 49m.			14h. 15m.				
158	7	Su.	♓	☌ ♄. ☿.	4 23	7 34	1 0	4 34	7 23	1 1	4 51	7 6	1 1	1 55	3 1
159	8	M.	♓	Mars rises 3.11 M.	4 23	7 35	1 31	4 34	7 24	1 34	4 51	7 6	1 37	2 57	4 0
160	9	Tu.	♈	Antares s. 11.8 A.	4 23	7 36	2 5	4 34	7 24	2 10	4 51	7 7	2 16	4 2	4 59
161	10	W.	♈	☌ ♆ ♂; ☌ ♆ ☾; ☌ ♂ ☾.	4 22	7 36	2 44	4 34	7 25	2 50	4 51	7 7	3 0	5 7	5 54
162	11	Th.	♉	☌ ☿ ☾.	4 22	7 37	3 29	4 34	7 25	3 37	4 51	7 8	3 49	6 10	6 48
163	12	Fr.	♉	● 12th. ☌ ♄ ☾.	4 22	7 37	Sets.	4 34	7 26	Sets.	4 51	7 8	Sets.	7 10	7 40
164	13	Sa.	♊	☌ ☿ ☾; ☾ in perigee. ♎.	4 22	7 38	8 17	4 34	7 26	8 10	4 51	7 8	7 56	8 9	8 32
24.	2d Sunday after Trinity.			Day's Length:	15h. 16m.			14h. 53m.			14h. 18m.				
165	14	Su.	♊	Jupiter sets 11.17 A.	4 22	7 38	9 11	4 34	7 27	9 5	4 51	7 9	8 53	9 7	9 22
166	15	M.	♋	Vega s. 0.38 M.	4 22	7 38	10 0	4 34	7 27	9 55	4 51	7 9	9 45	10 3	10 12
167	16	Tu.	♋	Altair s. 2.6 M.	4 22	7 39	10 42	4 34	7 27	10 38	4 51	7 10	10 31	11 0	11 4
168	17	W.	♌	☌ ♅ ☾.	4 22	7 39	11 19	4 34	7 27	11 17	4 51	7 10	11 13	11 59	11 57
169	18	Th.	♌	☌ ♄ ☉.	4 23	7 39	11 52	4 34	7 28	11 52	4 52	7 10	11 51	...	1 0
170	19	Fr.	♍	☾ 19th. ☌ ♁ ☾; ☿ in ♌; □ ♁ ☉.	4 23	7 40	Morn.	4 34	7 28	Morn.	4 52	7 11	Morn.	0 56	1 59
171	20	Sa.	♍	☾ in ♌.	4 23	7 40	0 23	4 34	7 28	0 25	4 52	7 11	0 26	1 58	3 2
25.	3d Sunday after Trinity.			Day's Length:	15h. 17m.			14h. 55m.			14h. 19m.				
172	21	Su.	♍	☉ enters ♋: summer begins.	4 23	7 40	0 54	4 34	7 29	0 58	4 52	7 11	1 2	3 1	4 3
173	22	M.	♎	Saturn rises 4.31 M.	4 23	7 40	1 26	4 35	7 29	1 31	4 52	7 11	1 39	4 4	5 0
174	23	Tu.	♎	☌ ☿ ♄.	4 24	7 40	2 1	4 35	7 29	2 8	4 53	7 11	2 17	5 6	5 51
175	24	W.	♏	☿ in perihelion.	4 24	7 40	2 38	4 35	7 29	2 46	4 53	7 11	2 58	6 2	6 35
176	25	Th.	♏	Uranus sets 11.43 A.	4 24	7 40	3 18	4 36	7 29	3 27	4 53	7 11	3 40	6 52	7 17
177	26	Fr.	♏	☿ in perihelion. ♆.	4 25	7 40	4 1	4 36	7 29	4 10	4 54	7 12	4 24	7 36	7 53
178	27	Sa.	♐	○ 27th. ☌ ☿ ☉ superior.	4 25	7 40	Rises.	4 37	7 29	Rises.	4 54	7 12	Rises.	8 14	8 23
26.	4th Sunday after Trinity.			Day's Length:	15h. 15m.			14h. 52m.			14h. 18m.				
179	28	Su.	♐	☾ in apogee.	4 25	7 40	8 18	4 37	7 29	8 11	4 54	7 12	8 0	8 48	8 50
180	29	M.	♑	Fomalhaut s. 4.21 M.	4 26	7 40	8 55	4 37	7 29	8 49	4 55	7 12	8 39	9 19	9 14
181	30	Tu.	♑	Neptune rises 1.59 M.	4 26	7 40	9 29	4 38	7 29	9 25	4 55	7 12	9 17	9 49	9 41

MOON'S PHASES. (*Standard Time.*)

	Eastern. d. h. m.	Central. d. h. m.	Mountain. d. h. m.	Pacific. d. h. m.
Last Quarter	5 7 5 A.	5 6 5 A.	5 5 5 A.	5 4 5 A.
New Moon	12 5 42 A.	12 4 42 A.	12 3 42 A.	12 2 42 A.
First Quarter	19 8 48 M.	19 7 48 M.	19 6 48 M.	19 5 48 M.
Full Moon	27 6 18 M.	27 5 18 M.	27 4 18 M.	27 3 18 M.

A BRIEF GUIDE TO THE DECADE.

June 1, 1880, fell on Tuesday.	June 1, 1886, will fall on Tuesday.
" 1881, " " Wednesday.	" 1887, " " " Wednesday.
" 1882, " " Thursday.	" 1888, " " " Friday.
" 1883, " " Friday.	" 1889, " " " Saturday.
" 1884, " " Sunday.	" 1890, " " " Sunday.

Sixth Month. *30 Days.*

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1726. — J. Hutton, Scotch geologist.
1787. — L. C. Prévost, French geologist.
1819. — J. C. Adams, English astronomer.
1436. — Regiomontanus, German astronomer.

1821. — Sir Samuel W. Baker, Eng. traveller.

1706. — J. Dollond, English optician.
1790. — J. E. Teschemacher, Am. mineralogist.

1773. — Thomas Young, English physicist.

1800. — Lord Rosse, Irish astronomer.
1821. — E. G. Squier, American archeologist.
1791. — Denison Olmstead, American physicist.
1781. — George Stephenson, English engineer.
1811. — Carlo Matteucci, Italian physicist.

1646. — G. W. Leibnitz, German mathematician.
1781. — S. D. Poisson, French physicist.
1815. — J. J. Oppel, German physicist.
1777. — John Ross, British Arctic navigator.
1814. — Paul Daubrée, French geologist.

1806. — A. de Morgan, English mathematician.

1812. — C. G. Page, American electrician.
1804. — C. U. Shepard, American mineralogist.
1818. — Angelo Secchi, Italian astronomer.

"There, through the long, long summer hours,
The golden light should lie,
And thick young herbs and groups of flowers
Stand in their beauty by."
BRYANT.

JULY, 1885.

"The crows flapped over by twos and threes,
In the pool drowsed the cattle up to their knees,
The little birds sang as if it were
The one day of summer in all the year,
And the very leaves seemed to sing on the trees." LOWELL.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (Standard Time.) Morn. H. M.	Eve. H. M.
182	1	W.	♑	♂ in ☊.	4 27	7 40	10 1	4 38	7 29	9 58	4 55	7 12	9 52	10 22	10 14
183	2	Th.	♒	Venus sets 8.30 A.	4 27	7 40	10 31	4 39	7 29	10 30	4 56	7 12	10 26	10 56	10 49
184	3	Fr.	♒	☉ in apogee; ☾ in ♑.	4 28	7 40	11 1	4 39	7 29	11 1	4 56	7 12	11 0	11 35	11 28
185	4	Sa.	♓	☿ gr. Hel. Lat. N.	4 29	7 39	11 32	4 40	7 28	11 34	4 57	7 11	11 36	. . .	0 23
27.	5th Sunday after Trinity.			Day's Length:	15h. 10m.			14h. 48m.			14h. 14m.				
186	5	Su.	♓	☽ 5th. Alphacca s. 8.33 A.	4 29	7 39	Morn.	4 40	7 28	Morn.	4 57	7 11	Morn.	0 15	1 18
187	6	M.	♓	Antares s. 9.21 A.	4 29	7 39	0 4	4 41	7 28	0 8	4 58	7 11	0 12	1 10	2 19
188	7	Tu.	♈	Mars rises 2.27 M.	4 30	7 38	0 39	4 41	7 28	0 45	4 58	7 11	0 53	2 15	3 25
189	8	W.	♈	☿ ♆ ☾.	4 31	7 38	1 19	4 42	7 27	1 26	4 59	7 11	1 37	3 28	4 33
190	9	Th.	♉	☿ ♂ ☾.	4 32	7 38	2 5	4 43	7 27	2 13	4 59	7 10	2 26	4 43	5 34
191	10	Fr.	♉	☿ ☿ ☾. ♋.	4 33	7 37	2 59	4 43	7 26	3 8	4 59	7 10	3 22	5 54	6 32
192	11	Sa.	♊	☾ in perigee.	4 33	7 37	4 2	4 44	7 26	4 11	5 0	7 10	4 25	6 58	7 27
28.	6th Sunday after Trinity.			Day's Length:	15h. 2m.			14h. 41m.			14h. 8m.				
193	12	Su.	♊	● 11th, 12th. Jupiter sets 9.37 A.	4 34	7 36	Sets.	4 45	7 26	Sets.	5 1	7 9	Sets.	7 57	8 18
194	13	M.	♋	☿ ☿ ☾; ♂ ☿ ☾.	4 35	7 36	8 35	4 45	7 25	8 31	5 1	7 9	8 22	8 54	9 7
195	14	Tu.	♋	☿ ♃ ☾.	4 36	7 35	9 16	4 46	7 24	9 13	5 2	7 9	9 8	9 47	9 55
196	15	W.	♌	Vega s. 10.56 A.	4 37	7 34	9 52	4 47	7 24	9 51	5 3	7 8	9 49	10 39	10 42
197	16	Th.	♌	☿ ☉ ☾.	4 38	7 34	10 25	4 48	7 23	10 26	5 3	7 8	10 26	11 32	11 34
198	17	Fr.	♍	☿ ☿ ☿; ☾ in ☊.	4 38	7 33	10 57	4 48	7 23	11 0	5 4	7 8	11 3	. . .	0 23
199	18	Sa.	♍	☿ gr. Hel. Lat. N.	4 39	7 32	11 30	4 49	7 22	11 35	5 5	7 7	11 40	0 26	1 22
29.	7th Sunday after Trinity.			Day's Length:	14h. 52m.			14h. 32m.			14h. 2m.				
200	19	Su.	♎	☾ 18th. Saturn rises 3.0 M.	4 40	7 32	Morn.	4 50	7 22	Morn.	5 5	7 7	Morn.	1 23	2 24
201	20	M.	♎	♂ ♄ η Geminorum.	4 41	7 31	0 4	4 51	7 21	0 10	5 6	7 6	0 18	2 24	3 29
202	21	Tu.	♏	Altair s. 11.45 A.	4 42	7 30	0 40	4 52	7 20	0 48	5 7	7 5	0 58	3 33	4 30
203	22	W.	♏	Fomalhaut s. 2.50 M.	4 43	7 29	1 19	4 52	7 19	1 27	5 7	7 5	1 40	4 42	5 24
204	23	Th.	♏	Markab. s. 2.54 M. ♎.	4 44	7 28	2 1	4 53	7 19	2 10	5 8	7 4	2 24	5 41	6 13
205	24	Fr.	♐	Uranus sets 9.51 A.	4 45	7 27	2 46	4 54	7 18	2 55	5 8	7 4	3 9	6 33	6 48
206	25	Sa.	♐	☾ in apogee.	4 46	7 26	3 34	4 55	7 17	3 43	5 9	7 3	3 57	7 16	7 29
30.	8th Sunday after Trinity.			Day's Length:	14h. 38m.			14h. 20m.			13h. 52m.				
207	26	Su.	♐	○ 26th. ♂ ☿ *Regulus.*	4 47	7 25	4 27	4 56	7 16	4 35	5 10	7 2	4 48	7 51	7 59
208	27	M.	♑	☿ in ♍.	4 48	7 24	Rises.	4 57	7 15	Rises.	5 10	7 2	Rises.	8 24	8 26
209	28	Tu.	♑	Algenib s. 3.43 M.	4 49	7 23	8 5	4 57	7 14	8 2	5 11	7 1	7 55	8 53	8 49
210	29	W.	♒	Polaris s. 4.48 M.	4 50	7 22	8 35	4 58	7 13	8 33	5 12	7 0	8 29	9 21	9 18
211	30	Th.	♒	Neptune rises 11.59 A.	4 51	7 21	9 5	4 59	7 12	9 5	5 12	6 59	9 3	9 50	9 47
212	31	Fr.	♓	☾ in ♍.	4 52	7 20	9 35	5 0	7 12	9 37	5 13	6 58	9 38	10 22	10 19

Seventh Month. 31 Days.

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1750. — Franz Huber, Swiss entomologist.
1803. — Edouard Constant Biot, Fr. astronomer.
1840. — Francis A. Walker, American publicist.

1817. — Karl Vogt, Swiss naturalist.
1820. — W. J. M. Rankine, Scotch engineer.
1766. — Alexander Wilson, Amer. ornithologist.
1831. — Daniel C. Gilman, American educator.
1809. — Robert W. Gibbes, American naturalist.
1809. — F. A. Quenstedt, German geologist.
1732. — J. J. de LaLande, French astronomer.
1795. — Samuel L. Dana, American chemist.
1811. — W. R. Grove, English physicist.

1817. — Henry D. Thoreau, Amer. naturalist.
1800. — J. B. Dumas, French chemist.
1801. — Johannes Müller, German physiologist.

1746. — G. Piazzi, Italian astronomer.
1768. — Thaddeus M. Harris, Amer. naturalist.
1811. — Karl L. Littrow, Austrian astronomer.

1806. — A. D. Bache, American geodesist.
1846. — Edward C. Pickering, Am. astronomer.
1810. — H. V. Regnault, French physicist.
1784. — F. W. Bessel, German astronomer.
1752. — M. A. Pictet, Swiss physicist.
1737. — A. Dalrymple, English hydrographer.
1778. — Heinrich A. Vogel, German chemist.

1787. — T. F. L. Nees v. Esenbeck, Ger. botanist.
1667. — Johann Bernouilli, Swiss mathematician.
1787. — Thomas Say, American zoölogist.
1801. — G. B. Airy, English astronomer.
1800. — Friedrich Wöhler, German chemist.
1829. — J. A. Meigs, American ethnologist.

MOON'S PHASES. *(Standard Time.)*

	Eastern. d. h. m.		Central. d. h. m.		Mountain. d. h. m.		Pacific. d. h. m.	
Last Quarter	5 7 26	M.	5 6 26	M.	5 5 26	M.	5 4 26	M.
New Moon	12 0 16	M.	11 11 16	A.	11 10 16	A.	11 9 16	A.
First Quarter	18 7 20	A.	18 6 20	A.	18 5 20	A.	18 4 20	A.
Full Moon	26 9 23	A.	26 8 23	A.	26 7 23	A.	26 6 23	A.

A BRIEF GUIDE TO THE DECADE.

July 4, 1880, fell on Sunday.	July 4, 1886, will fall on Sunday.
" 1881, " " Monday.	" 1887, " " " Monday.
" 1882, " " Tuesday.	" 1888, " " " " Wednesday.
" 1883, " " Wednesday.	" 1889, " " " " Thursday.
" 1884, " " Friday.	" 1890, " " " " Friday.

"The tender speckled moth here dancing seen,
The vaulting grasshopper of glossy green,
And all-prolific summer's sporting train,
Their little lives by various pow'rs sustain."

BLOOMFIELD.

AUGUST, 1885.

"*The sky is a drinking-cup that was o'erturned of old,*
And it poureth forth in the eyes of men its wine of airy gold.
We drink of the wine all day, till the last drop is drained up,
And are lighted off to bed by the jewels in the cup."

R. H. STODDARD.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	LATITUDE OF BOSTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF WASHINGTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF CHARLESTON, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	HIGH WATER, NEW YORK. (*Standard Time.*) Morn. H. M.	Eve. H. M.
213	1	Sa.	♌	Antares s. 7.40 A.	4 53	7 19	10 6	5 1	7 11	10 9	5 14	6 57	10 13	11 2	10 59
31.	9th Sunday after Trinity.			Day's Length:	14h. 24m.			14h. 7m.			13h. 43m.				
214	2	Su.	♌	Venus sets 8.19 A.	4 54	7 18	10 39	5 2	7 9	10 44	5 14	6 57	10 51	11 48	11 45
215	3	M.	♍	☽ 3d. Vega s. 9.42 A.	4 55	7 16	11 16	5 3	7 8	11 23	5 15	6 56	11 32	. . .	0 43
216	4	Tu.	♍	☌ ☿; ☌ ♀.	4 56	7 15	11 58	5 4	7 7	Morn.	5 16	6 55	Morn.	0 41	1 46
217	5	W.	♎	☌ ♄, μ Geminorum; ☌ ♃ ♀.	4 57	7 14	Morn.	5 5	7 6	0 6	5 16	6 54	0 18	1 49	2 57
218	6	Th.	♎	☿ gr. elong. E. 27°23′; ☌ ♂ ♄.	4 58	7 13	0 47	5 5	7 5	0 56	5 17	6 53	1 9	3 10	4 10
219	7	Fr.	♎	☿ in aphelion; ☌ ♄ ☾; ☌ ♂ ☾. ♏.	4 59	7 11	1 43	5 6	7 4	1 52	5 18	6 52	2 6	4 32	5 18
220	8	Sa.	♎	☌ ☿ ♀.	5 0	7 10	2 46	5 7	7 3	2 55	5 19	6 52	3 8	5 44	6 17
32.	10th Sunday after Trinity.			Day's Length:	14h. 8m.			13h. 54m.			13h. 32m.				
221	9	Su.	♏	☾ in perigee.	5 1	7 9	3 55	5 8	7 2	4 3	5 19	6 51	4 15	6 47	7 10
222	10	M.	♏	● 10th. Mars rises 1.48 M.	5 2	7 7	Sets.	5 9	7 0	Sets.	5 20	6 50	Sets.	7 43	8 1
223	11	Tu.	♐	☌ ♃ ☾.	5 3	7 6	7 46	5 10	6 59	7 44	5 21	6 49	7 40	8 35	8 48
224	12	W.	♐	☌ ☿ ☾; ☌ ♀ ☾.	5 4	7 4	8 22	5 11	6 58	8 22	5 21	6 48	8 21	9 24	9 34
225	13	Th.	♑	☌ ♁ ☾; ☾ in ♐.	5 5	7 3	8 56	5 12	6 56	8 58	5 22	6 47	9 0	10 9	10 22
226	14	Fr.	♑	Altair s. 10.10 A.	5 6	7 2	9 30	5 13	6 55	9 34	5 23	6 45	9 38	10 56	11 7
227	15	Sa.	♒	Fomalhaut s. 1.16 M.	5 7	7 0	10 4	5 14	6 54	10 10	5 24	6 44	10 17	11 47	11 54
33.	11th Sunday after Trinity.			Day's Length:	13h. 51m.			13h. 38m.			13h. 19m.				
228	16	Su.	♒	Jupiter sets 7.37 A.	5 8	6 59	10 39	5 15	6 53	10 46	5 24	6 43	10 56	. . .	0 40
229	17	M.	♒	☾ 17th. Markab s. 1.16 M.	5 10	6 57	11 17	5 15	6 51	11 25	5 25	6 42	11 37	0 48	1 41
230	18	Tu.	♓	□ ☿ ☉.	5 11	6 56	11 58	5 16	6 50	Morn.	5 26	6 41	Morn.	1 50	2 46
231	19	W.	♓	☌ ♀ β Virginis.	5 12	6 54	Morn.	5 17	6 49	0 7	5 26	6 40	0 20	3 2	3 50
232	20	Th.	♈	☿ stationary. ♑.	5 13	6 53	0 42	5 18	6 47	0 51	5 27	6 39	1 5	4 14	4 49
233	21	Fr.	♈	☾ in apogee.	5 14	6 51	1 30	5 19	6 46	1 39	5 27	6 38	1 53	5 16	5 39
234	22	Sa.	♈	Saturn rises 1.2 M.	5 15	6 50	2 21	5 20	6 44	2 30	5 28	6 36	2 42	6 4	6 22
34.	12th Sunday after Trinity.			Day's Length:	13h. 32m.			13h. 22m.			13h. 6m.				
235	23	Su.	♉	Algenib s. 2.0 M.	5 16	6 48	3 15	5 21	6 43	3 23	5 29	6 35	3 35	6 44	6 58
236	24	M.	♉	☌ ♁ ♀.	5 17	6 46	4 11	5 22	6 42	4 18	5 30	6 34	4 27	7 19	7 27
237	25	Tu.	♊	○ 25th. Uranus sets 7.47 A.	5 18	6 45	Rises.	5 23	6 40	Rises.	5 30	6 33	Rises.	7 50	7 54
238	26	W.	♊	Polaris s. 2.58 M.	5 19	6 43	7 9	5 24	6 39	7 8	5 31	6 32	7 6	8 21	8 27
239	27	Th.	♊	☌ ☿ ♃; ☿ gr. Hel. Lat. S.; ☾ in ♋.	5 20	6 41	7 39	5 25	6 38	7 40	5 31	6 30	7 40	8 51	8 54
240	28	Fr.	♌	♆ stationary.	5 21	6 40	8 10	5 26	6 36	8 13	5 32	6 29	8 15	9 19	9 25
241	29	Sa.	♌	Achernar s. 3.3 M.	5 22	6 38	8 43	5 26	6 34	8 47	5 33	6 28	8 53	9 54	10 0
35.	13th Sunday after Trinity.			Day's Length:	13h. 14m.			13h. 6m.			12h. 54m.				
242	30	Su.	♍	Neptune rises 9.58 A.	5 23	6 37	9 18	5 27	6 33	9 24	5 33	6 27	9 33	10 35	10 40
243	31	M.	♍	☌ ♆ ☾.	5 24	6 35	9 57	5 28	6 31	10 4	5 34	6 25	10 15	11 23	11 29

Eighth Month. *31 Days.*

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1778. — John C. Warren, American anatomist.
1779. — Lorenz Oken, German naturalist.
1818. — Maria Mitchell, American astronomer.

1773. — Jeremiah Day, American mathematician.

1802. — N. H Abel, Norwegian mathematician.
1766. — William H. Wollaston, Eng. physicist.
1727 — James Bowdoin, American physicist.
1799. — Benjamin Silliman, American chemist.

1822. — J. A. W. Moleschott, Dutch physiologist.
1779. — Joachim Barrande, Bohemian paleontol.
1814. — Jeffries Wyman, American physiologist.
1814. — A. J. Ångström, Swedish astronomer.
1819. — George G. Stokes, Irish physicist.
1777. — H. C. Oersted, Danish physicist.

1743. — A. L. Lavoisier, French chemist.
1821. — A. Cayley, English mathematician.
1699. — B. J. Jussieu, French botanist.
1640. — J. Flamsteed, English astronomer.
1793. — Elisha Mitchell, American naturalist.
1794. — Bernhard Studer, Swiss geologist.
1820. — John Tyndall, English physicist.
1647. — D. Papin, French physicist.
1796. — Baden Powell, English mathematician.

1769. — George Cuvier, French naturalist.
1784. — Joseph E. Worcester, American geographer and philologist.

1749. — Wilhelm von Goethe, Ger. poet and nat.
1810. — O. M. Mitchel, Amer. astronomer.
1779. — J. J. Berzelius, Swedish chemist.
1809. — Oliver Wendell Holmes, Am. physiol.

Oswald Heers, Swiss naturalist.
1821. — H. L. F. Helmholtz, German physicist.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
LAST QUARTER	3 4 56 A.	3 3 56 A.	3 2 56 A.	3 1 56 A.
NEW MOON	10 7 14 M.	10 6 14 M.	10 5 14 M.	10 4 14 M.
FIRST QUARTER	17 8 47 M.	17 7 47 M.	17 6 47 M.	17 5 47 M.
FULL MOON	25 0 25 A.	25 11 25 M.	25 10 25 M.	25 9 25 M.

A BRIEF GUIDE TO THE DECADE.

Aug. 1, 1880, fell on Sunday.
" 1881, " " Monday.
" 1882, " " Tuesday.
" 1883, " " Wednesday.
" 1884, " " Friday.

Aug. 1, 1886, will fall on Sunday.
" 1887, " " " Monday.
" 1888, " " " Wednesday.
" 1889, " " " Thursday.
" 1890, " " " Friday.

"Earth's increase, foison plenty,
Barns and garners never empty,
Vines with clustering bunches growing,
Plants with goodly burthen bowing;
Spring come to you at the farthest
In the very end of harvest!" SHAKSPEARE.

SEPTEMBER, 1885.

"The wind-flower and the violet, they perished long ago,
And the brier-rose and the orchis died amid the summer glow;
But on the hill the golden-rod, and the aster in the wood,
And the yellow sunflower by the brook in autumn beauty stood."
BRYANT.

Mean time is used unless otherwise specified.

PLANETARY PHENOMENA.

LATITUDE OF BOSTON.

LATITUDE OF WASHINGTON.

LATITUDE OF CHARLESTON, S.C.

HIGH WATER, NEW YORK. (*Standard Time.*)

Ninth Month. *30 Days.*

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water Morn. H. M.	High Water Eve. H. M.
244	1	Tu.	♉	☽ 1st. Hamel s. 3.18 M.	5 25	6 33	10 42	5 29	6 29	10 51	5 35	6 24	11 3	. . .	0 18
245	2	W.	♉	2d. ☌ ☿ ☉ inferior.	5 26	6 31	11 34	5 30	6 28	11 43	5 35	6 23	11 57	0 30	1 23
246	3	Th.	□	☌ ♄ ☾. ♎.	5 27	6 30	Morn.	5 31	6 26	Morn.	5 36	6 21	Morn.	1 45	2 38
247	4	Fr.	□	☌ ♂ ☾.	5 29	6 28	0 32	5 32	6 25	0 41	5 37	6 20	0 55	3 10	3 54
248	5	Sa.	♋	Venus sets 7.41 A.	5 30	6 26	1 36	5 33	6 23	1 45	5 37	6 19	1 57	4 29	5 2
36.	14th Sunday after Trinity.			Day's Length:	12h. 53m.			12h. 48m.			12h. 39m.				
249	6	Su.	♋	☾ in perigee.	5 31	6 24	2 45	5 34	6 22	2 52	5 38	6 17	3 3	5 37	6 0
250	7	M.	♌	☌ ☿ ☾.	5 32	6 23	3 56	5 35	6 20	4 2	5 38	6 16	4 10	6 34	6 53
251	8	Tu.	♌	● 8th. ☌ ♃ ☾; ☌ ♃ ☉.	5 33	6 21	Sets.	5 35	6 19	Sets.	5 39	6 15	Sets.	7 25	7 41
252	9	W.	♌	☌ ♁ ☾; ☾ in ♌.	5 34	6 19	6 51	5 36	6 17	6 52	5 40	6 13	6 52	8 11	8 32
253	10	Th.	♍	Algol s. 3.42 M.	5 35	6 18	7 25	5 37	6 15	7 28	5 40	6 12	7 31	8 54	9 14
254	11	Fr.	♍	☌ ☿ ☾.	5 36	6 16	7 59	5 38	6 14	8 4	5 41	6 11	8 10	9 38	9 55
255	12	Sa.	♎	☿ stationary; ☿ in ♍.	5 37	6 14	8 35	5 39	6 12	8 41	5 42	6 9	8 50	10 23	10 39
37.	15th Sunday after Trinity.			Day's Length:	12h. 34m.			12h. 31m.			12h. 25m.				
256	13	Su.	♎	Mars rises 1.16 M.	5 38	6 12	9 13	5 40	6 11	9 21	5 43	6 8	9 32	11 8	11 25
257	14	M.	♏	Vega s. 6.57 A.	5 39	6 11	9 54	5 41	6 9	10 3	5 43	6 7	10 15	11 59	. . .
258	15	Tu.	♏	☾ 15th. ☿ in ♌; ☿ gr.el.W.17°52′.	5 40	6 9	10 37	5 42	6 8	10 46	5 44	6 5	11 0	0 18	0 53
259	16	W.	♏	☾ 16th. Jupiter rises 5.16 M. ♃.	5 41	6 7	11 24	5 42	6 6	11 33	5 44	6 4	11 47	1 19	1 54
260	17	Th.	♐	Saturn rises 11.26 A.	5 42	6 5	Morn.	5 43	6 4	Morn.	5 45	6 3	Morn.	2 29	2 56
261	18	Fr.	♐	☾ in apogee.	5 43	6 3	0 14	5 44	6 3	0 23	5 46	6 2	0 36	3 38	3 58
262	19	Sa.	♑	Uranus sets 6.14 A.	5 44	6 2	1 7	5 45	6 1	1 15	5 46	6 0	1 27	4 37	4 49
38.	16th Sunday after Trinity.			Day's Length:	12h. 14m.			12h. 14m.			12h. 12m.				
263	20	Su.	♑	☿ in perihelion.	5 46	6 0	2 2	5 46	6 0	2 9	5 47	5 59	2 19	5 24	5 33
264	21	M.	♑	Altair s. 7.41 A.	5 47	5 58	2 59	5 47	5 58	3 5	5 48	5 58	3 12	6 5	6 11
265	22	Tu.	♒	☉ enters ♎; autumn begins.	5 48	5 56	3 58	5 48	5 57	4 2	5 48	5 56	4 7	6 40	6 52
266	23	W.	♒	○ 23d. ☾ in ♉.	5 49	5 55	4 58	5 49	5 55	5 1	5 49	5 55	5 3	7 15	7 23
267	24	Th.	♓	☾ 24th. ♂ in *Præsepe*.	5 50	5 53	Rises.	5 50	5 53	Rises.	5 50	5 53	Rises.	7 41	7 56
268	25	Fr.	♓	Neptune rises 8.16 A.	5 51	5 51	6 44	5 51	5 51	6 48	5 50	5 52	6 52	8 17	8 30
269	26	Sa.	♈	☌ ♃ ☉.	5 52	5 49	7 18	5 52	5 50	7 24	5 51	5 51	7 31	8 54	9 7
39.	17th Sunday after Trinity.			Day's Length:	11h. 55m.			11h. 56m.			11h. 57m.				
270	27	Su.	♈	☌ ☿ ♃.	5 53	5 48	7 57	5 52	5 48	8 4	5 52	5 49	8 14	9 34	9 47
271	28	M.	♉	☌ ♆ ☾.	5 54	5 46	8 41	5 53	5 47	8 49	5 52	5 48	9 1	10 18	10 34
272	29	Tu.	♉	Fomalhaut s. 10.15 A.	5 55	5 44	9 30	5 54	5 45	9 39	5 53	5 47	9 52	11 6	11 30
273	30	W.	♊	☿ gr. Hel. Lat. N. ♎.	5 56	5 43	10 25	5 55	5 43	10 34	5 54	5 45	10 48	. . .	0 3

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1806. — Stephen Alexander, Amer. astronomer.
1814. — James J. Sylvester, Eng. mathematician.
1766. — J. Dalton, English chemist.
1826. — T. Sterry Hunt, Canadian chemist.
1811. — J. M. Gilliss, American astronomer.
1813. — John Cassin, American naturalist.
1707. — G. L. L. Buffon, French naturalist.
1837. — Raphael Pumpelly, American geologist.
1771. — Mungo Park, Scotch explorer.
1839. — Charles S. Peirce, Amer. mathematician.
1798. — F. E. Neumann, German mineralogist.
1778. — H. M. D. Blainville, French zoölogist.
1811. — James Hall, American paleontologist.
1778. — J. G. A. Chevallier, French optician.
1769. — Alexander Humboldt, German savant.
1732. — A. M. Legendre, French mathematician.
1819. — J. B. L. Foucault, French physicist.
1796. — Richard Harlan, American zoölogist.
1813. — C. H. F. Peters, American astronomer.
1809. — D. Houghton, American geologist.
1791. — M. Faraday, English physicist.
1791. — J. F. Encke, German astronomer.
1819. — H. L. Fizeau, French physicist.
1750. — Abraham Gottlob Werner, Ger. geol.
1798. — Elie de Beaumont, French geologist.
1719. — A. G. Kästner, German mathematician.
1824. — Benj. A. Gould, American astronomer.
1807. — Arnold Guyot, Swiss and Amer. geog.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
LAST QUARTER	2 0 15 M.	1 11 15 A.	1 10 15 A.	1 9 15 A.
NEW MOON	8 3 43 A.	8 2 43 A.	8 1 43 A.	8 0 43 A.
FIRST QUARTER	16 1 15 M.	16 0 15 M.	15 11 15 A.	15 10 15 A.
FULL MOON	24 2 55 M.	24 1 55 M.	24 0 55 M.	23 11 55 A.

A BRIEF GUIDE TO THE DECADE.

Sept. 1, 1880, fell on Wednesday.	Sept. 1, 1886, will fall on Wednesday.
" 1881, " " Thursday.	" 1887, " " " Thursday.
" 1882, " " Friday.	" 1888, " " " Saturday.
" 1883, " " Saturday.	" 1889, " " " Sunday.
" 1884, " " Monday.	" 1890, " " " Monday.

"The swamp-oak, with his royal purple on,
Glares red as blood across the sinking sun,
The chestnuts, lavish of their long-hid gold,
To the faint summer, beggard now and old,
Pour back the sunshine hoarded 'neath her fahoting eye."
LOWELL.

OCTOBER, 1885.

"Thou blossom, bright with autumn dew,
And colored with the heaven's own blue,
That openest when the quiet light
Succeeds the keen and frosty night;
Thou waitest late, and com'st alone,
When woods are bare and birds have flown." BRYANT.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (Standard Time.) Morn. H. M.	Eve. H. M.
274	1	Th.	□	☽ 1st. □ ♄ ☉; ♂ ♄ ☾.	5 58	5 41	11 26	5 56	5 42	11 35	5 54	5 44	11 48	0 38	1 9
275	2	Fr.	□	Venus sets 7.13 A.	5 59	5 39	Morn.	5 57	5 40	Morn.	5 55	5 43	Morn.	1 56	2 22
276	3	Sa.	♋	♂ ☌ ☾; ☾ in perigee.	6 0	5 37	0 32	5 58	5 39	0 40	5 56	5 42	0 52	3 17	3 36
40.	18th Sunday after Trinity.			Day's Length:	11h. 35m.			11h. 38m.			11h. 44m.				
277	4	Su.	♋	☿ ♁ ☿.	6 1	5 36	1 40	5 59	5 37	1 46	5 56	5 40	1 56	4 28	4 43
278	5	M.	Ω	Fomalhaut s. 9.52 A.	6 2	5 34	2 50	6 0	5 36	2 55	5 57	5 39	3 0	5 26	5 44
279	6	Tu.	Ω	♂ ♆ ☾.	6 3	5 32	4 0	6 1	5 34	4 3	5 58	5 38	4 5	6 15	6 35
280	7	W.	♍	7th. ☿ ♁ ☾; ☿ ☿ ☾; ☾ in Ω.	6 4	5 31	5 8	6 2	5 33	5 9	5 59	5 36	5 8	7 3	7 23
281	8	Th.	♍	● 8th. Mars rises 0.52 M.	6 5	5 29	Sets.	6 3	5 31	Sets.	6 0	5 35	Sets.	7 48	8 6
282	9	Fr.	♎	Markab s. 9.44 A.	6 7	5 27	6 30	6 4	5 30	6 36	6 0	5 34	6 44	8 29	8 49
283	10	Sa.	♎	Algenib s. 10.48 A.	6 8	5 25	7 8	6 5	5 28	7 15	6 1	5 33	7 25	9 12	9 32
41.	19th Sunday after Trinity.			Day's Length:	11h. 15m.			11h. 21m.			11h. 29m.				
284	11	Su.	♍	☿ ♀ ☾.	6 9	5 24	7 47	6 6	5 27	7 55	6 2	5 31	8 7	9 53	10 15
285	12	M.	♍	Jupiter rises 4.2 M.	6 10	5 22	8 29	6 7	5 25	8 38	6 2	5 30	8 51	10 34	11 0
286	13	Tu.	♍	Polaris s. 11.45 A. ♈	6 11	5 21	9 16	6 8	5 24	9 25	6 3	5 29	9 39	11 17	11 49
287	14	W.	♐	Achernar s. 11.58 A.	6 13	5 19	10 6	6 9	5 22	10 15	6 4	5 28	10 28	. . .	0 3
288	15	Th.	♐	☿ 15th. ♂ ☿ ☉ superior.	6 14	5 17	10 58	6 10	5 21	11 7	6 5	5 26	11 19	0 45	0 54
289	16	Fr.	♑	☿ in aphelion; ☾ in apogee.	6 15	5 16	11 52	6 11	5 20	Morn.	6 5	5 25	Morn.	1 47	1 48
290	17	Sa.	♑	Hamel s. 0.17 M.	6 16	5 14	Morn.	6 12	5 18	0 0	6 6	5 24	0 11	2 49	2 45
42.	20th Sunday after Trinity			Day's Length:	10h. 56m.			11h. 4m.			11h. 16m.				
291	18	Su.	♑	Algol s. 1.13 M.	6 17	5 13	0 48	6 13	5 17	0 54	6 7	5 23	1 3	3 45	3 42
292	19	M.	♒	Saturn rises 9.24 A.	6 18	5 11	1 46	6 14	5 15	1 51	6 8	5 22	1 57	4 30	4 37
293	20	Tu.	♒	♄ stationary; ☾ in ♉.	6 19	5 10	2 45	6 15	5 14	2 48	6 8	5 21	2 52	5 12	5 21
294	21	W.	♓	♄ in perihelion; ♂ ♃ β Virginis.	6 21	5 8	3 46	6 16	5 13	3 47	6 9	5 20	3 48	5 54	6 3
295	22	Th.	♓	Aldebaran s. 2.96 M.	6 22	5 7	4 49	6 17	5 11	4 49	6 10	5 19	4 47	6 33	6 44
296	23	Fr.	♓	○ 23d. ☿ in ♉.	6 23	5 5	5 53	6 18	5 10	5 51	6 11	5 18	5 46	7 12	7 27
297	24	Sa.	♈	Uranus rises 4.12 M.	6 24	5 4	Rises.	6 19	5 9	Rises.	6 11	5 17	Rises.	7 53	8 10
43.	21st Sunday after Trinity.			Day's Length:	10h. 37m.			10h. 47m.			11h. 3m.				
298	25	Su.	♈	♂ ♅ ☾.	6 25	5 2	6 37	6 20	5 7	6 45	6 12	5 15	6 57	8 35	8 55
299	26	M.	♉	Capella s. 2.49 M.	6 26	5 1	7 25	6 21	5 6	7 34	6 13	5 14	7 47	9 18	9 44
300	27	Tu.	♉	Rigel s. 2.46 M. ♌.	6 28	5 0	8 20	6 22	5 5	8 29	6 14	5 13	8 43	10 5	10 38
301	28	W.	□	♂ ♄ ☾; ☾ in perigee.	6 29	4 58	9 21	6 24	5 4	9 30	6 15	5 12	9 43	10 56	11 39
302	29	Th.	□	Neptune rises 6.0 A.	6 30	4 57	10 25	6 25	5 3	10 33	6 16	5 12	10 45	11 53	. . .
303	30	Fr.	♋	☽ 30th. Canopus s. 3.46 M.	6 32	4 55	11 31	6 26	5 1	11 38	6 16	5 11	11 48	0 48	0 56
304	31	Sa.	♋	♂ ♂ ☾.	6 33	4 54	Morn.	6 27	5 0	Morn.	6 17	5 10	Morn.	2 3	2 5

Tenth Month. 31 Days.

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1814. — H. A. E. A. Faye, French astronomer.

1732 — N. Maskelyne, English astronomer.
1789. — William Scoresby, English explorer.
1803. — H. W. Dove, German meteorologist.

1801. — A. A. de la Rive, Swiss physicist.
1731. — H. Cavendish, English physicist.

1792. — C. G. Gmelin, German chemist.
1802. — Hugh Miller, Scotch geologist.
1827. — J. P. Cooke, American chemist.
1788. — Sir Edward Sabine, Irish geographer.
1810. — J. A. F. Plateau, Belgian physicist.
1608. — Evangelista Torricelli, Italian physicist.
1803. — Robert Stephenson, English engineer.
1814. — Hanns Bruno Geinitz, German geologist.

1632. — Sir Christopher Wren, English architect.

1729. — J. R. Forster, German voyager.
1632. — A. v. Leeuwenhoek, Dutch microscopist.
1808. — Bernhard Cotta, German geologist.

1781 — Chester Dewey, American botanist.
1792. — Franklin Bache, American chemist.
1728. — Capt. Cook, English navigator.
1806. — Alphonse de Candolle, Swiss botanist.
1656. — E. Halley, English astronomer.
1831. — O. C. Marsh, American paleontologist.
1783. — K. W. G. Kastner, German chemist.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
LAST QUARTER	1 6 29 M.	1 5 29 M.	1 4 29 M.	1 3 29 M.
NEW MOON	8 2 31 M.	8 1 31 M.	8 0 31 M.	7 11 31 A.
FIRST QUARTER	15 8 20 A.	15 7 20 A.	15 6 20 A.	15 5 20 A.
FULL MOON	23 4 22 A.	23 3 22 A.	23 2 22 A.	23 1 22 A.
LAST QUARTER	30 0 58 A.	30 11 58 M.	30 10 58 M.	30 9 58 M.

A BRIEF GUIDE TO THE DECADE.

Oct. 1, 1880, fell on Friday.
" 1881, " " Saturday.
" 1882, " " Sunday.
" 1883, " " Monday.
" 1884, " " Wednesday.
Oct. 1, 1886, will fall on Friday.
" 1887, " " " Saturday.
" 1888, " " " Monday.
" 1889, " " " Tuesday.
" 1890, " " " Wednesday.

"The sobered robin, hunger-silent now,
Seeks cedar-berries blue, his autumn cheer;
The squirrel, on the shingly shagbark's bough,
Now saws, now lists with downward eye and ear."

LOWELL.

NOVEMBER, 1885.

"On my cornice linger the ripe black grapes ungathered;
Children fill the groves with the echoes of their glee,
Gathering tawny chestnuts, and shouting when beside them
Drops the heavy fruit of the tall black-walnut tree."

BRYANT.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	LATITUDE OF BOSTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF WASHINGTON. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	LATITUDE OF CHARLESTON, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	HIGH WATER, NEW YORK. (*Standard Time.*) Morn. H. M.	Eve. H. M.
44.	22d Sunday after Trinity.			Day's Length:	10h. 18m.			10h. 31m.			10h. 51m.				
305	1	Su.	♌	Sirius s. 3.57 M.	6 34	4 52	0 39	6 28	4 59	0 44	6 18	5 9	0 51	3 12	3 17
306	2	M.	♌	☿ in aphelion.	6 35	4 52	1 47	6 29	4 58	1 51	6 19	5 8	1 54	4 14	4 25
307	3	Tu.	♍	☌☿; ☌♁ ☾; ☾ in ☊.	6 36	4 50	2 54	6 30	4 57	2 56	6 20	5 7	2 57	5 9	5 22
308	4	W.	♍	Venus sets 7.16 A.	6 38	4 49	4 1	6 31	4 56	4 1	6 21	5 6	3 59	6 0	6 14
309	5	Th.	♍	Fomalhaut s 7.50 A.	6 39	4 48	5 6	6 32	4 55	5 4	6 22	5 6	4 59	6 47	7 2
310	6	Fr.	♎	● 6th. Markab s. 7.53 A.	6 40	4 47	6 11	6 34	4 54	6 7	6 23	5 5	6 0	7 29	7 47
311	7	Sa.	♎	♁♀☾.	6 42	4 46	Sets.	6 35	4 53	Sets.	6 24	5 4	Sets.	8 10	8 31
45.	23d Sunday after Trinity.			Day's Length:	10h. 2m.			10h. 16m.			10h. 38m.				
312	8	Su.	♍	♈ gr. Hel. Lat. S.	6 43	4 45	6 23	6 36	4 52	6 32	6 25	5 3	6 45	8 50	9 14
313	9	M.	♍	Mars rises 0.15 M.	6 44	4 44	7 8	6 37	4 51	7 17	6 26	5 2	7 31	9 27	9 55
314	10	Tu.	♐	☌♀☾. ♡.	6 45	4 42	7 56	6 38	4 50	8 5	6 26	5 1	8 19	10 4	10 37
315	11	W.	♐	Algenib s. 8.42 A.	6 47	4 41	8 47	6 39	4 49	8 56	6 27	5 1	9 9	10 41	11 20
316	12	Th.	♐	☾ in apogee.	6 48	4 40	9 40	6 40	4 48	9 48	6 28	5 0	10 0	11 18	. . .
317	13	Fr.	♑	Polaris s. 9.43 A.	6 49	4 40	10 35	6 41	4 47	10 42	6 29	5 0	10 52	0 7	11 58*
318	14	Sa.	♑	☾ 14th. Achernar s. 9.56 A.	6 51	4 39	11 31	6 42	4 47	11 37	6 30	4 59	11 44	0 58	0 44
46.	24th Sunday after Trinity.			Day's Length:	9h. 46m.			10h. 2m.			10h. 28m.				
319	15	Su.	♒	Jupiter rises 2.19 M.	6 52	4 38	Morn.	6 44	4 46	Morn.	6 31	4 59	Morn.	1 48	1 39
320	16	M.	♒	☌♆☉; ☾ in ♉.	6 53	4 37	0 29	6 45	4 45	0 33	6 32	4 58	0 38	2 38	2 33
321	17	Tu.	♒	Hamel s. 10.11 A.	6 54	4 36	1 29	6 46	4 45	1 31	6 33	4 58	1 34	3 32	3 27
322	18	W.	♓	Algol s. 11.7 A.	6 55	4 35	2 31	6 47	4 44	2 32	6 34	4 57	2 31	4 23	4 22
323	19	Th.	♓	Aldebaran s. 0.36 M.	6 57	4 35	3 35	6 48	4 43	3 34	6 35	4 57	3 30	5 12	5 17
324	20	Fr.	♈	Saturn rises 7.14 A.	6 58	4 34	4 40	6 49	4 43	4 37	6 36	4 56	4 31	5 59	6 9
325	21	Sa.	♈	☽ 22d. ♂♆☾.	6 59	4 33	5 47	6 50	4 42	5 42	6 36	4 56	5 34	6 47	7 2
47.	25th Sunday after Trinity.			Day's Length:	9h. 33m.			9h. 51m.			10h. 19m.				
326	22	Su.	♉	Uranus rises 2 25 M.	7 0	4 33	Rises.	6 51	4 42	Rises.	6 37	4 56	Rises.	7 33	7 55
327	23	M.	♉	☿ gr. Hel. Lat. S.	7 2	4 32	6 8	6 52	4 41	6 17	6 38	4 55	6 31	8 19	8 48
328	24	Tu.	□	☌♄☾; ☾ in perigee. ◠.	7 3	4 32	7 9	6 54	4 41	7 18	6 39	4 55	7 32	9 7	9 43
329	25	W.	□	Capella s. 0.51 M.	7 4	4 31	8 14	6 54	4 40	8 23	6 40	4 55	8 36	9 58	10 39
330	26	Th.	♋	Rigel s. 0.48 M.	7 5	4 31	9 21	6 55	4 40	9 29	6 41	4 54	9 39	10 47	11 40
331	27	Fr.	♋	Canopus s. 1.56 M.	7 6	4 30	10 30	6 56	4 39	10 36	6 42	4 54	10 44	11 42	. . .
332	28	Sa.	♌	☽ 28th. Neptune sets 5.55 M.	7 7	4 30	11 39	6 57	4 39	11 43	6 42	4 54	11 48	0 45	0 39
48.	1st Sunday in Advent.			Day's Length:	9h. 21m.			9h. 41m.			10h. 11m.				
333	29	Su.	♌	♂♂☾.	7 8	4 29	Morn.	6 58	4 39	Morn.	6 43	4 54	Morn.	1 49	1 47
334	30	M.	♌	☿ gr. el. E. 21° 21′; ☌♁☾; ☾ in ☊.	7 9	4 29	0 47	6 59	4 39	0 49	6 44	4 54	0 51	2 53	2 54

Eleventh Month. 30 Days.

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1810. — Gen. A. A. Humphreys, Am. engineer.
1815. — G. Boole, English mathematician.
1786. — E. F. Germar, German naturalist.
1744. — Johann Bernouilli, Swiss astronomer.
1798. — Karl Kreil, Austrian meteorologist.
1809. — R. H. Kohlrausch, German physicist.
1818. — E. H. du Bois-Reymond, Ger. physicist.

1781. — G. A. A. Plana, Italian mathematician.
1748. — C. L. Berthollet, French physicist.
1805. — Charles Pickering, American naturalist.
1743. — C. P. Thunberg, Swedish naturalist.
1795. — Thaddeus W. Harris, Am. entomologist.
1842. — Lord Rayleigh, English physicist.
1797 — Sir Charles Lyell, English geologist.

1738. — F. W. Herschel, English astronomer.
1793. — M. Chasles, French mathematician.
1717. — J. le R. d'Alembert, French geometer.
1790. — A. F. Moebius, German astronomer.
1810. — Asa Gray, American botanist
1821. — F. F. E. Brünnow, Amer. astronomer
1832. — N. A. E. Nordenskiöld, Finnish traveller.

1819. — Joseph D. Whitney, American geologist.

1796. — A. von Ettingshausen, Ger. physicist.
1817. — Charles A. Wurtz, French chemist.
1701. — A. Celsius, Swedish physicist.
1734. — Johann A. Euler, Russ. mathematician.

* Second morning tide.

MOON'S PHASES. (*Standard Time.*)

	EASTERN. d. h. m.	CENTRAL. d. h. m.	MOUNTAIN. d. h. m.	PACIFIC. d. h. m.
NEW MOON	6 4 3 A.	6 3 3 A.	6 2 3 A.	6 1 3 A.
FIRST QUARTER	14 4 59 A.	14 3 59 A.	14 2 59 A.	14 1 59 A.
FULL MOON	22 4 39 M.	22 3 39 M.	22 2 39 M.	22 1 39 M.
LAST QUARTER	28 8 57 A.	28 7 57 A.	28 6 57 A.	28 5 57 A.

A BRIEF GUIDE TO THE DECADE.

Nov. 1, 1880, fell on Monday.
" 1881, " " Tuesday.
" 1882, " " Wednesday.
" 1883, " " Thursday.
" 1884, " " Saturday.

Nov. 1, 1886, will fall on Monday
" 1887, " " Tuesday.
" 1888, " " Thursday.
" 1889, " " Friday.
" 1890, " " Saturday

"Within the hall are song and laughter,
The cheeks of Christmas grow red and jolly,
And sprouting is every corbel and rafter
With the lightsome green of ivy and holly."

LOWELL.

DECEMBER, 1885.

"The snow-bird twittered on the beechen bough,
And 'neath the hemlock, whose thick branches bent
Beneath its bright cold burden, and kept dry
A circle, on the earth, of withered leaves,
The partridge found a shelter. Through the snow
The rabbit sprang away."

BRYANT.

Mean time is used unless otherwise specified.

Day of Year.	Day of Month.	Day of Week.	Moon's Constellation.	PLANETARY PHENOMENA.	Latitude of Boston. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Washington. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	Latitude of Charleston, S.C. Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. H. M.	High Water, New York. (Standard Time.) Morn. H. M.	Eve. H. M.
335	1	Tu.	♏	☌ ☋ ☾.	7 10	4 28	1 53	7 0	4 39	1 53	6 45	4 54	1 52	3 55	3 58
336	2	W.	♏	Venus sets 7.55 A.	7 11	4 28	2 57	7 1	4 38	2 55	6 46	4 54	2 52	4 54	4 58
337	3	Th.	♎	□ ☌ ☉.	7 12	4 28	4 0	7 2	4 38	3 57	6 47	4 54	3 50	5 44	5 54
338	4	Fr.	♎	Algenib s. 7.11 A.	7 13	4 28	5 1	7 3	4 38	4 56	6 47	4 54	4 47	6 32	6 47
339	5	Sa.	♏	Polaris s. 8.17 A.	7 14	4 28	6 1	7 4	4 38	5 55	6 48	4 54	5 44	7 15	7 33
49.	2d Sunday in Advent.			Day's Length:	9h. 13m.			9h. 33m.			10h. 5m.				
340	6	Su.	♏	● 6th. Achernar s. 8.29 A.	7 15	4 28	Sets.	7 5	4 38	Sets.	6 49	4 54	Sets.	7 56	8 18
341	7	M.	♏	☌ ☿ ☾. ☋.	7 16	4 28	5 48	7 6	4 38	5 57	6 50	4 54	6 11	8 33	8 59
342	8	Tu.	♐	☿ gr. el. E. 47°19′; ☌ ♃ η Virginis.	7 17	4 28	6 38	7 7	4 38	6 47	6 51	4 54	7 1	9 5	9 37
343	9	W.	♐	☿ stationary.	7 18	4 28	7 31	7 8	4 38	7 40	6 52	4 54	7 52	9 38	10 14
344	10	Th.	♑	☌ ☿ ☾; ☾ in apogee.	7 19	4 28	8 26	7 8	4 38	8 34	6 52	4 55	8 45	10 7	10 49
345	11	Fr.	♑	Mars rises 11.20 A.	7 20	4 28	9 21	7 9	4 39	9 27	6 53	4 55	9 36	10 36	11 26
346	12	Sa.	♑	☿ in ☊.	7 21	4 28	10 18	7 10	4 39	10 23	6 54	4 55	10 29	11 12	. . .
50.	3d Sunday in Advent.			Day's Length:	9h. 7m.			9h. 28m.			10h. 1m.				
347	13	Su.	♒	Algol s. 9.29 A.	7 21	4 28	11 16	7 11	4 39	11 19	6 54	4 55	11 23	0 4	11 56*
348	14	M.	♒	☾ 1.5th. ☾ in ♈.	7 22	4 29	Morn.	7 11	4 39	Morn.	6 55	4 55	Morn.	0 48	0 37
349	15	Tu.	♓	Jupiter rises 0.42 M.	7 23	4 29	0 16	7 12	4 40	0 17	6 56	4 56	0 18	1 40	1 28
350	16	W.	♓	Aldebaran s. 10.46 A.	7 23	4 29	1 16	7 13	4 40	1 16	6 56	4 56	1 14	2 37	2 26
351	17	Th.	♈	☿ in perihelion.	7 24	4 29	2 18	7 14	4 40	2 10	6 57	4 57	2 11	3 35	3 29
352	18	Fr.	♈	☌ ☿ ☉ inferior.	7 25	4 30	3 24	7 14	4 41	3 20	6 57	4 57	3 13	4 33	4 37
353	19	Sa.	♈	☌ ♆ ☾.	7 26	4 30	4 31	7 15	4 41	4 25	6 58	4 58	4 16	5 30	5 41
51.	4th Sunday in Advent.			Day's Length:	9h. 5m.			9h. 27m.			10h. 0m.				
354	20	Su.	♉	Saturn rises 5.6 A.	7 26	4 31	5 39	7 15	4 42	5 31	6 58	4 58	5 21	6 24	6 43
355	21	M.	♉	☾ 21st. ☉ ents. ♑; winter begins;	7 26	4 31	Rises.	7 15	4 42	Rises.	6 59	4 59	Rises.	7 17	7 42
356	22	Tu.	□	☾ in perigee. ♎; ☌ ♄ ☾.	7 27	4 32	5 54	7 16	4 43	6 3	6 59	4 59	6 17	8 6	8 38
357	23	W.	□	Capella s. 10.57 A.	7 27	4 32	7 3	7 16	4 43	7 11	7 0	5 0	7 23	8 56	9 34
358	24	Th.	♋	Uranus rises 0.25 M.	7 28	4 33	8 14	7 17	4 44	8 21	7 0	5 0	8 30	9 45	10 29
359	25	Fr.	♋	Rigel s. 10.50 A.	7 28	4 34	9 26	7 17	4 44	9 31	7 1	5 1	9 37	10 34	11 26
360	26	Sa.	♌	□ ♃ ☉; ♂ ♄ ☉.	7 29	4 34	10 36	7 18	4 45	10 39	7 1	5 1	10 42	11 25	. . .
52.	Sunday after Christmas.			Day's Length:	9h. 6m.			9h. 28m.			10h. 0m.				
361	27	Su.	♌	☌ ☿ ☾; ☿ gr. H.L.N.; ☾ in ☊.	7 29	4 35	11 44	7 18	4 46	11 45	7 2	5 2	11 45	0 23	0 22
362	28	M.	♍	☽ 28th. ☌ ♃ ☾; ☌ ♁ ☾; □ ♁ ☉.	7 29	4 36	Morn.	7 18	4 46	Morn.	7 2	5 3	Morn.	1 21	1 21
363	29	Tu.	♍	☿ stationary.	7 29	4 36	0 49	7 19	4 47	0 48	7 2	5 4	0 45	2 26	2 24
364	30	W.	♎	☉ perigee.	7 30	4 37	1 53	7 19	4 48	1 50	7 3	5 4	1 45	3 30	3 29
365	31	Th.	♎	Neptune sets 3.41 M.	7 30	4 38	2 55	7 19	4 49	2 51	7 3	5 5	2 43	4 32	4 37

Twelfth Month. *31 Days.*

BIRTHDAYS OF SCIENTIFIC CELEBRITIES.

1838. — Cleveland Abbé, American meteorologist.
1818. — John L. LeConte, Amer. entomologist.

1778. — L. J. Gay-Lussac, French chemist.
1786. — J. G. Charpentier, Swiss geologist.
1804. — W. B. Rogers, American geologist.
1810. — Theodor Schwann, Belgian physiologist.

1781. — Sir David Brewster, Scotch chemist.
1731. — Erasmus Darwin, English physicist.

1743. — Sir Jos. Banks, English naturalist.
1816. — Ernst Werner Siemens, Eng. electrician
1546. — Tycho Brahe, Danish astronomer.
1834. — Charles A. Young, American astronomer.
1493. — Paracelsus, Swiss chemist.
1778. — Sir Humphry Davy, English chemist.
1797. — Joseph Henry, American physicist.
1714. — John Winthrop, Am. math. and astron.
1787. — O. von Kotzebue, Russian navigator.
* Second morning tide.
1805. — T. Graham, Scotch chemist.

1790. — J. F. Champollion, French Egyptologist
1792. — Charles Babbage, Eng. mathematician.
1818. — J. P. Joule, English physicist.
1813. — Joseph Lovering, American physicist.
1756. — B. G. Lacépède, French naturalist.

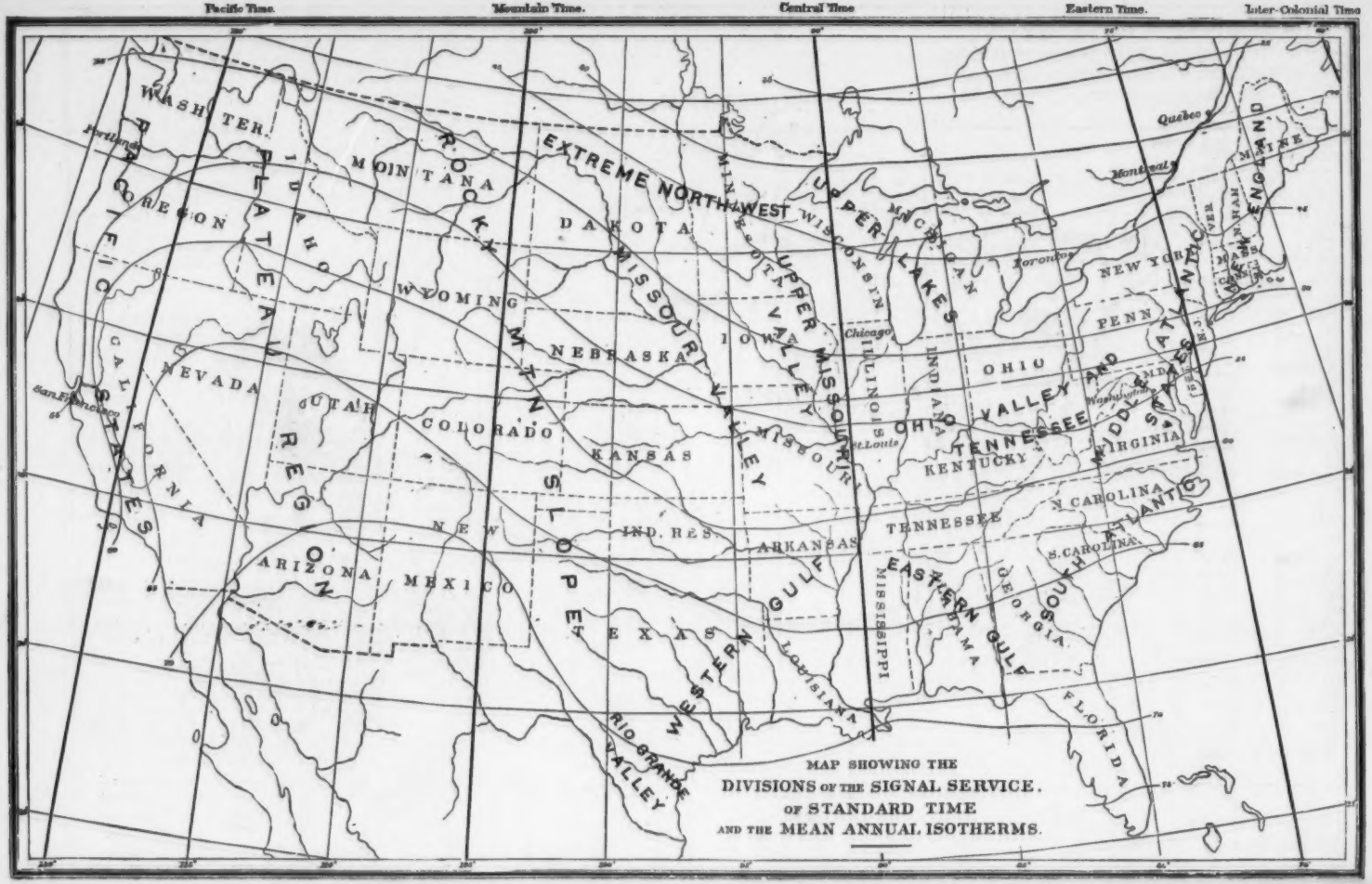
1571. — J. Kepler, German astronomer.
1822. — Louis Pasteur, French physiologist.
1818. — C. R. Fresenius, German chemist.
1796. — J. C. Poggendorff, German physicist.
1784. — Major S. H. Long, American explorer.
1796. — John E. Holbrook, American zoölogist.

MOON'S PHASES. (*Standard Time.*)

	Eastern. d. h. m.	Central. d. h. m.	Mountain. d. h. m.	Pacific. d. h. m.
New Moon	6 8 16 M.	6 7 16 M.	6 6 16 M.	6 5 16 M.
First Quarter	14 1 22 A.	14 0 22 A.	14 11 22 M.	14 10 22 M.
Full Moon	21 3 58 A.	21 2 58 A.	21 1 58 A.	21 0 58 A.
Last Quarter	28 7 22 M.	28 6 22 M.	28 5 22 M.	28 4 22 M.

A BRIEF GUIDE TO THE DECADE.

Dec. 1, 1880, fell on Wednesday.	Dec. 1, 1886, will fall on Wednesday.
" 1881, " " Thursday.	" 1887, " " " Thursday.
" 1882, " " Friday.	" 1888, " " " Saturday.
" 1883, " " Saturday.	" 1889, " " " Sunday.
" 1884, " " Monday.	" 1890, " " " Monday.



MAP SHOWING THE
DIVISIONS OF THE SIGNAL SERVICE.
OF STANDARD TIME
AND THE MEAN ANNUAL ISOTHERMS.

THERE are but few families of the floral kingdom that are more interesting, as regards their life-history and their physical peculiarities, than the ORCHIDS. Until very recent years, they were little known in this country, and even now they are not fully appreciated or understood, save by botanists and a small number of floriculturists. On the Continent of Europe, however, their curious shapes, their exquisite beauty, and the delightful fragrance of the rarer species of some of these plants have attracted many observers; and it may even be said of the orchids that there they are looked upon as "THE ELITE OF THE FLORAL KINGDOM."

The natural habitat of the orchid is chiefly in the tropics, and by far the most beautiful of the species comes from the East Indies. Certain species are found growing in all warm and moist latitudes, while a few grow in this country as far north as Canada.

There are two general classes of orchids: one class, called the Epiphytes, embraces those plants which live upon other plants, branches of trees, on blocks of dry wood, and even upon stone, deriving sustenance from the air; the other class, the Terrestrial, few in number, include the plants which grow in and upon the soil. The most beautiful and the most costly species of orchids belong to the first class. These two classes are distributed into seven orders, severally named in accordance with their individual peculiarities.

The magnificent volume, the full title of which is given above, is the most extensive attempt yet made to illustrate the orchids. It contains twenty-four reproductions, each life size, and resplendent in natural color. All of these illustrations were drawn by the artist from specimens found in American collections. Such collections are not numerous, indeed, they are exceedingly rare, and have cost their several owners thousands of dollars. It is reported that a small fortune has been paid for a single plant. Next to possessing one's own collection of orchids is the possession of this, the only work which has ever succeeded in doing justice to these regal flowers.

In the volume, the order of MALAXEÆ is exhibited by three exquisite illustrations. The characteristic feature of the blossoms is their waxy softness. The *Dendrobiums* are notable types, and are not only highly prized as such, but are looked upon as among the most beautiful of the orchidaceæ. Some of them bloom in summer, others in the winter; some can be raised only in green-houses, while others, and they are many, will grow readily in the sitting-room.

THE SECOND ORDER OF ORCHIDS is embellished with two specimens of *Masdevalliæ*, five of the *Cattleyæ*, and three of the *Læliæ*. Some of the Masdevallia present a remarkable appearance, and the flowers closely resemble spiders and other insects. What the rose and the lily are among flowers, the Cattleya is among orchids, — pre-eminently beautiful. The flowers present all shades of rose, rosy-lilac, crimson, carmine, and ruby-purple. Being natives of the temperate regions of South America, they can be grown easily in our climate, and thrive well on billets of wood in pots or baskets. The illustrations of this exceedingly interesting variety are among the finest in the volume, and the longer the eyes linger over them the greater and stronger grows the attraction. Not long ago, one specimen of Cattleya Trianæ, a variety here shown, commanded eleven hundred dollars at a public auction.

THE STORY OF THE ORCHID.

THE story of how the orchids became so much admired is fraught with interest. Travellers in the East had long known of their lovely existence, but they brought home with them only preserved specimens. At length a few living plants were carried to England, were kept alive for a season, and, finally, they perished. Other attempts were made to grow them, and, since 1820, the true plan of their growth and propagation has

been understood. The orchids are now reared in all parts of the world, and, as their rarity decreases, their cost is diminished and their popularity increases.

THE CULTIVATION OF ORCHIDS is easily comprehended, and the method is very simple, as the pages of this volume successfully explain. Heat, ventilation, and moisture are the chief factors. "An orchid house," says the author, "should smell sweet as a flowery meadow does during a sudden burst of sunshine after a summer shower." They require, however, "as much care as a large family of children, and in bestowing such attention on the plants we come to love them."

The variety of PHALÆNOPSIS, of which three illustrations are presented in the volume, derives its name from a fancied resemblance of the central part of the flower to a winged moth or butterfly. To the same order belong the varieties of Oncidium and the Calanthe, each illustrated with one specimen. For winter decoration, the last named is very desirable, their only defect being want of foliage. The *Ærides*, or Air Plants, are set forth in one design, which admirably reveals a combination of rich, evergreen foliage and opposite leaves, with gracefully curved flower stalks and beautiful blossoms. They are natives of the hottest parts of India and other tropical regions, and, attached to trees, imbibe their whole nutriment from the atmosphere. They are all of easy growth, and are not costly.

THE THIRD AND MOST NUMEROUS OF THE ORCHID TRIBES is the Odontoglossum. Of this species three varieties are displayed in the volume. These are properly classed as "cool orchids," and are found chiefly in the mountain ranges. Two specimens of the Lycaste are shown. One of these, the Lycaste Aromatica, is of the same tribe as the Vanilla Aromatica, which furnishes the rich vanilla-bean of commerce. Another beautiful orchid exhibited in the volume is the Vanda Suavis, sometimes called "the sacred mistletoe." The variety of Cymbidium receives one illustration. It is so named on account of the fancied resemblance of the centre of its flower to a canoe or boat.

THE SEVENTH AND LAST TRIBE OF ORCHIDS is the Cypripedium, of which three specimens are shown. Of this tribe, species are quite generally distributed over most Northern States and Canada. The State of New York furnishes six varieties. The word "Cypripedium" is synonymous with "Venus's Slipper." Cypripedium Nivium, or snowy-white Venus's Slipper, exhibits flowers of pure white, dotted minutely in violet. One glance at this exquisite floral gem suggests the devout sentiment of Mrs. Sigourney: —

> "Who hung thy beauty on such slender stalk,
> Thou glorious flower?"

But it is impossible, in this brief sketch, to give more than the merest suggestive outline of the scope, value, and interest attached to this truly regal volume. While looking over these plates, which fairly rival Nature herself, one cannot but recall the study which the late Mr. Charles Darwin gave to orchids; indeed, his volume on "Insect Fertilization" can fittingly be read in connection with them. Our interest in orchids is enhanced by a knowledge that they seem to possess a sort of intelligence, and that they are mostly dependent for the germination of seed and their future growth upon insect agency. Mr. Darwin has explained all this, and these pictures still further elucidate the methods. We behold how it is that the insects, generally bees and the butterflies, are attracted by the perfume, or by their own hunger, to the bosom of flowers where pollen is stored; that, while feeding or visiting in the flowers, a portion of the pollen adheres to the insect, and is carried by it to a needed spot, — some pistillate plant. The poet Cowper thus expresses the scientific truth in regard to orchid reproduction: —

> "These have their sexes; and, when summer shines,
> The bee transports the fertilizing meal
> From flower to flower, and e'en the breathing air
> Wafts the rich prize to its appropriate use."

THE ROYAL FAMILY OF PLANTS

ORCHIDS

CONTENTS.

With twenty-four magnificent illustrations, life size, from living plants.

INTRODUCTION		
OTULINE OF THE ORCHID FLORA		
HYMN TO THE FLOWERS		
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DENDROBIUM DEVONIANUM		Illustrated.
DENDROBIUM AINSWORTHII		Illustrated.
DENDROBIUM NOBILE		Illustrated.
MASDEVALLIA	(*For Don José Masdevall*)	
MASDEVALLIA VEITCHII		Illustrated.
CATTLEYA	(*For William Cattley*)	
CATTLEYA TRIANÆ		Illustrated.
CATTLEYA CHOCOENSIS		Illustrated.
CATTLEYA MOSSIÆ		Illustrated.
CATTLEYA LODDIGESII		Illustrated.
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